

Wow 

001 THE HANDBOOK TECHNICAL GUIDE

DALER  ROWNEY

CRYLA[®]

**ARTISTS'
ACRYLIC**

HEAVY BODY

HAUTE VISCOSITÉ

PUREST PIGMENT

A COMPREHENSIVE GUIDE TO CRYLA ARTISTS' ACRYLIC COLOUR

INTRODUCTION

Daler-Rowney has provided artists with the very best colours and materials for over 225 years. Since 1783 when brothers Richard and Thomas Rowney started preparing and selling artists colours in London, painters world-wide have been convinced of the excellent quality of Daler-Rowney products. Using the knowledge gained over centuries of colour manufacturing coupled with new technologies and materials that are being developed, Daler-Rowney has always undertaken a continuous programme of technical improvement to create ranges such as Cryla Artists' Acrylic that surpass all the standards.

Cryla Artists' Acrylic was introduced by Rowney & co. in 1963. It pioneered the use of artists' acrylics in Europe and is one of the significant milestones in the company's development. Cryla Artists' Acrylic colour is a very heavy bodied colour with a high loading of permanent, light-fast purest pigments. The unique heavy, buttery feel under the brush and knife is popular with artists wanting to achieve numerous impasto effects.

Acrylic colours are classed as the "new" painting medium as they have only been around for a few decades. Acrylics have gained in popularity over the years and are now the painting mediums of choice. This is due to the plethora of application techniques and their ability to take to virtually any surface.

The versatility of acrylics is built into the formulation of the paint, giving them excellent adhesion properties that allows to stick to surfaces from concrete to wood. Acrylics have the flexibility to move with the surface, expanding and contracting while still maintaining their integrity. Acrylics on canvas can even be loosely rolled up without affecting the finished film. Thinning with water allows watercolour techniques to be achieved without having to choose specially sized surfaces. Using the colour straight from the tube allows oil like impasto marks to be created without the drawback of long drying times or worrying about "fat over lean" principles.

This booklet provides information on Cryla Artists' Acrylic, from explaining the chemistry and composition of the colours through to the working properties and application techniques.

WHAT MAKES UP A CRYLA ARTISTS' ACRYLIC COLOUR?



There are three main components to any acrylic colour. These are:

Pigment: Gives the colour its colour
Binder / Vehicle: Acrylic Co-Polymer and water emulsion, the acrylic co-polymer acts as a glue sticking the pigment to the surface
Additives: Products that control the working properties of acrylic

Purest Pigment
Pigments for Cryla Artists' Acrylic are the best pigments that can be sourced from around the world regardless of price. Pigments are inert solids that can be organic or inorganic and either naturally sourced (dug up from the ground) or synthetic (produced chemically in a factory). The pigments that are chosen for Cryla Artists' Acrylic are those that exhibit the highest levels of light-fastness and permanence along with giving a clean rich colour. Cryla Artists' Acrylic is formulated to have the maximum level of the Purest Pig-

ments.

Binder / Vehicle
The binder is the Acrylic Co-Polymer that acts as the glue that "sticks" the pigment to the painting surface. Acrylic Co-Polymers are long chains of repeating monomers (small chemical molecules) that are suspended in water, the vehicle, to create an emulsion. The quality of the Acrylic Co-Polymer is as important as the quality of the pigment to the colour.

CRYLA®

HOW IS CRYLA ARTISTS' ACRYLIC MADE?

SURPASSING THE STANDARDS

Cryla Artists' Acrylic colours are formulated in the research and development laboratory based in Bracknell, England with the knowledge gained from over 225 years of colour manufacturing. Each colour is individually formulated from one pigment or a combination of purest pigments are used to ensure only the strongest cleanest colour is produced with all the standard characteristics of Cryla Artists' Acrylic. These formulations are put through accelerated storage testing and the final film is tested to ensure the highest level of stability. Once the formulations have passed the rigorous testing they are passed to the manufacturing department to produce.

Skilled employees carefully weigh out the pigment, binder and additives into a bertha and mechanically mix it to disperse the pigment evenly throughout the binder. Once a homogenous mix has been achieved the colour is put over a triple roll mill. A triple roll mill consists of three rollers that rotate in alternate directions and have a very small gap between each one. As the colour passes through the mill the pigment is crushed to a smaller particle size and further dispersed into the binder. This process is repeated until an optimal particle size is achieved for each colour, grinding the pigment to its optimal partial size develops the colour fully giving a strong rich colour. Triple roll

milling is the traditional method of producing artist's colours since they were first commercially made. Originally the rollers were made of granite but now modern rollers are made of steel which gives even better results. Although the machinery used to make artists colours may have improved over the years the manufacturing process is still the same as it has always been.

Each colour is Quality Control checked through out the manufacturing process to ensure it meets the same exacting standards each time for colour, tinting strength, fineness of dispersion, consistency and stability. This ensures that all colours have the same characteristics and you can be confident that an old tube of colour is going to perform the same as a new tube.

HOW CRYLA ARTISTS' ACRYLIC WORKS

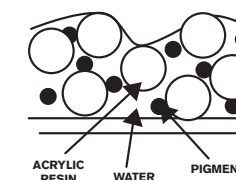
Cryla Artists' Acrylic dries by water evaporating from the liquid colour to create a final paint film that is flexible, non-yellowing and permanent.

Creation

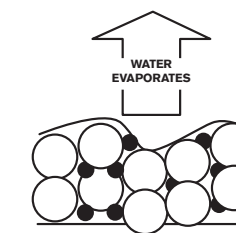
Colour is brushed or knifed onto the painting surface to create your mark, the colour is a mixture of finely dispersed pigment in an emulsion of water and acrylic co-polymer. The acrylic emulsion can be thought of as sticky balls of acrylic co-polymer that want to join together but are being held apart by the water.

Evaporation

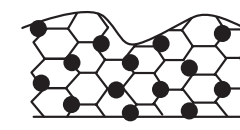
Once Cryla Artists' Acrylic is exposed to the atmosphere the water in the colour starts evaporating into the environment. This allows the sticky balls of acrylic co-polymer, which were being held apart by the water, to start to join together. As they join together they trap the finely dispersed pigment particles in-between the sticky balls. The action of the sticky balls of acrylic co-polymer coming together forces more water out through a capillary action. Once all of the water has evaporated from the colour the sticky balls can fully join together fixing the pigment in place. With all the sticky ball of acrylic co-polymer joined together they coalesce and form a matrix of acrylic co-polymer and pigment which is the final paint film.



WET COLOUR



WATER EVAPORATES



FINAL FILM

PROPERTIES OF CRYLA ARTISTS' ACRYLIC

CONFORMS AND EXCEEDS THE QUALITY REQUIREMENTS OF ASTM D 5098

Drying

Cryla Artists' Acrylic colours on average dry normally between 5 – 10 minutes. Thicker brush strokes and impasto marks will skin over in a short period of time but will take longer to through dry. The acrylic resin is normally fully polymerised over night so it is recommended to varnish over Cryla Artists' Acrylic after 24 hours. Room temperature and humidity will affect the drying time of Cryla Artists' Acrylic as warm dry conditions will speed up the drying time whereas cold humid conditions will slow it down.

This rapid drying time is one of the popular qualities of Cryla Artists' Acrylic. This is a great advantage to artists who wish to paint quickly. Paintings that may have taken weeks to complete in oil, because of the requirement to wait for paint layers to dry, can be completed in one session with Cryla Artists' Acrylic.

Colour Shift

Most acrylic colours have a colour shift from wet to dry. The reason for this colour shift is because of the Acrylic Co-Polymer emulsion being a pale milky colour in the wet form. When the water evaporates and the colour dries this pale milky colour disappears and becomes transparent. Cryla Artists' Acrylic has been specially formulated to minimise the effect that the colour shift has on the colours, consequently there is virtually no colour shift from the wet colour to the dry colour.

Thinning

Cryla Artists' Acrylic can be used straight from the tube if a rich buttery heavy bodied consistency is required. However it can be thinned with water if a more flowing or thinner consistency is required. Cryla Artists' Acrylic can also be mixed with any of the Daler-Rowney Artists' Acrylic Mediums, that will change the working properties.

Final Film

Once the Cryla Artists' Acrylic colour is fully dry it becomes water resistant and resistant to mild solvents. This stops the colour being re-dissolved when further layers of colours or varnish are painted on top. The final film is very flexible and will withstand the natural flexing of the surface that it is painted onto (e.g. Canvas, wooden panel, etc.). Paintings with Cryla Artists' Acrylic on canvas can even be loosely rolled for storage or transportation without affecting the final film. However this should never be done in extremely cold conditions. A high quality acrylic co-polymer is used in Cryla Artists' Acrylic colours which is non-yellow this prevents any shift in colour due to the acrylic film.

Cleaning

Once dry Cryla Artists' Acrylic cannot be re-wetted therefore care must be taken to ensure that Cryla Artists' Acrylic never dries on the brush. The colour can simply be washed out of brushes and off palettes using mild soap and water. This is an advantage to artists who may be sensitive to powerful solvents that are needed for cleaning oil colour.

ASTM International, originally known as the American Society for Testing and Materials (ASTM) has developed standard D 5098 which is the "Standard Specification for Artist' Acrylic Dispersion Paint". This standard sets out the requirements for the composition, physical properties, performance and labelling of artists acrylic colour. Cryla Artists' Acrylic complying with this standard is a commitment by Daler-Rowney to produce the highest quality artists' acrylic colour and provides a base of understanding among manufacturers and artists.

ASTM D 5098 Stipulates:

For Composition, Physical Properties and Performance that:

- Only acrylic polymer or acrylic co-polymer emulsions may be used.
- Only pigments recommended in the standard that are approved for quality and lightfastness are to be used.
- Other ingredients may only be used to achieve aging stability, control foam, ensure freeze-thaw stability, ensure coalescence and obtain the desired consistency. No ingredient can be added to cheapen colour, only to enhance working properties.

The pigments selected to go in Cryla Artists' Acrylic colour are selected for the purity and compatibility with the other ingredients contained within the colour. Only pigments including the

metallics that are tested to have proven high quality, durability and lightfastness are chosen for the colour range.

Every Cryla Artists' Acrylic colour has been uniquely formulated to ensure that each colour dries with the same sheen and have the same body, consistency and working properties. Cryla Artists' Acrylic Colour contains no dyes, toners or adulterants of any kind. Only 100% Acrylic Co-Polymer emulsion is used in the colours.

For Fineness of Grind

- Maximum allowed grind reading of pigment within the colour film is 40 microns.
- Cryla Artists' Acrylic colours greatly surpass this specification, most pigment are ground to the sub-micron size.

For Consistency

- Colours shall be smooth and creamy, the colour should not flow or level when applied with a palette knife.

Cryla Artists' Acrylic has a unique heavy bodied buttery consistency that is matched by no other on the market. Cryla Artists' Acrylic retains the shape of the brush stroke or the knife mark without feeling sticky and still wets well onto the surface.

For Freeze-Thaw Stability

- Colours must withstand 5 cycles of freezing to -7°C (20°F) and then thaw to room temperature. All batches of Cryla Artists' Acrylic colour are checked for stability over 14 cycles freezing to -40°C (-40°F) followed by thawing to room temperature.

CRYLA

CONFORMS AND EXCEEDS THE QUALITY REQUIREMENTS OF ASTM D 5098

CRYLA ARTISTS' ACRYLIC LABELLING

1 Colour Number

The colour number is a unique three-digit code for identifying the colour, it is the last three digits of the product code.

2 Colour Name

The colour name identifies the colour in the tube, this is sometimes called the common name. If the name does not fully describe the pigment contained within the colour then the pigment common name is placed underneath. If the colour is made up of more than one pigment the word "(Mixture)" appears under the name. On the back of the tube the pigments contained in the mixture can be found. If there is no text under the name the common name significantly describes the pigment in the colour and is the only pigment used.

3 Transparency

The pigments used and how finely they are ground dictate the transparency of the Cryla Artists' Acrylic colour. Pigments range from the most transparent, through semi-opaque to the most opaque. We use a clock face to further define the degree of opacity, ranging from 1 for the most transparent to 12 for the most opaque.



OPACITY 1



OPACITY 12

In defining the colours from transparent through to opaque we have considered the ability of the colour to produce clear transparent glazes. Because of their strength and intensity some of the transparent colours, such as Primary Cyan have a fairly good opacity as supplied, but when blended with Glaze Medium can be used to produce clear transparent glazes. Likewise colours such as Zinc White, that do not have great hiding power are regarded as opaque because they do not produce clear glazes.

Transparent Colours (Opacity Rating 1 – 4):

All of these colours can be used to produce transparent glazes that allow the underlying colour to show through the paint film and completely change the appearance of the colour.

Semi-Opaque Colours (Opacity Rating 5 – 8):

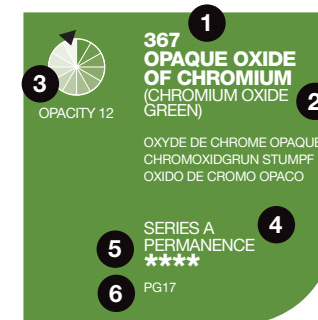
These colours have a higher degree of opacity, glazes produced will not be as clear.

Opaque Colours (Opacity Rating 9 – 12):

In general these colours have good hiding power. They would not normally be used for glazes, as any underlying colour would be dull.



8 CONFORMS TO ASTM D5098 LIGHTFAST I



As Cryla Artists' Acrylic is a professional quality range there are only four or three star permanence colours within the range.

4 Price Series

The Cryla Artists' Acrylic range has 4 price series A, B, C, D with A being the least expensive D being the most expensive. As the maximum amount of the Purest Pigments is loaded into the colour this is how the price series is assigned in Cryla Artists' Acrylic range. Inexpensive pigments such as Umbers and Siennas are naturally sourced so are lower priced, genuine Cobalts and Cadmiums are more expensive.

5 Permanence

Daler Rowney's permanence ratings are compiled from testing in our laboratory and are given a one to four star rating:

****** Permanent** These colours possess the highest degree of fastness to light and are inert towards other pigments. These pigments have been proven and used over decades.

***** Normally Permanent** In full strength these colours exhibit permanence comparable with the four star colours, but there may be some unavoidable loss of permanence if used in a thin glaze or much reduced with white. These are newer pigments.

**** Moderately Permanent** These colours either possess a lower degree of permanence than the previous class or they are not sufficiently inert towards other pigments.

*** Fugitive** These colours possess a lower degree of permanence than the previous class and are considered fugitive.

6 Colour Index Name

This is an internationally recognized code assigned to a particular "colorant." The C.I. Name consists of the category (P for Pigment), general hue (B for Blue) and serial number assigned, based on its chemical constitution. For example, PB 29, (Ultramarine Blue) indicates a specific Pigment Blue.

7 Pigment Simple Chemical Description

All chemicals can be described in a simple chemical description such as Quinacridone and Cadmium. This gives an indication of the chemical composition of the pigment(s) within the Cryla Artists' Acrylic colour. This is set out as stated in the ASTM D 5098 specification.

8 Conforms to ASTM D 5098

See "Conforms and Exceeds the Quality Requirements of ASTM D 5098" section of this booklet.

9 ASTM Lightfastness

The ASTM Lightfastness Ratings are provided by the American Society for Testing and Materials (ASTM) in the standard for "Artists' Acrylic Dispersion Paints" designation ASTM D 5098 – 05a. Colours with a Lightfastness Rating of I are considered Excellent and those with a Lightfastness Rating of II are Very Good

CRYLA®

Cryla | The Handbook

MUNSELL COLOUR

COMMUNICATING COLOURS

All Cryla Artists' Acrylic colours have been assigned a Munsell Colour through visual interpretation by the Daler-Rowney technical team in accordance to "The Munsell Book of Colour". Primarily the Munsell colour is a system used to communicate colour verbally between people that have "The Munsell Book of Colour" and is an internationally recognised standard. However it also helps describe the colour:

Hue: Is defined by letters

Y = Yellow	GY = Green Yellow
G = Green	BG = Blue Green
B = Blue	PB = Purple Blue
P = Purple	RP = Red Purple
R = Red	YR = Yellow Red

The numbers before indicate how far it is from that colour i.e. 0.00 Y gives you a middle yellow as the number increases the hue moves closer to the next colour i.e. 9.00 Y is heading towards Yellow Green so is a greener yellow than 0.00 Y was.

Value: Is the lightness scale with 0 being black and 10 being white.

Chroma: Is the intensity or vividness of the colour, with 0 being dull and 10 being vivid.

Below is the Munsell Value for each of the colours in the Cryla Artists' Acrylic range broken down into colour groups

Colour Number	Colour Name	Hue	Value	Chroma
Yellows – (Green Shade to Red Shade)				
637	Nickel Titanate Yellow	7.71Y	9.00	12.38
629	Bismuth Yellow (Vanadate)	6.25Y	9.15	18.74
611	Cadmium Yellow Pale	6.03Y	9.14	20.88
651	Lemon Yellow (Arylide Yellow 10G)	5.53Y	8.73	19.32
675	Primary Yellow (Mixture)	3.94Y	8.68	20.12
612	Cadmium Yellow	3.42Y	8.62	20.42
671	Permanent Yellow (Arylamide Mixture)	1.97Y	7.92	18.70
635	Naples Yellow Hue (Mixture)	9.97YR	8.60	10.24
613	Cadmium Yellow Deep (Mixture)	9.75 YR	7.74	18.16
632	Golden Yellow (Mixture)	7.19YR	7.08	17.56
615	Cadmium Orange	5.61YR	6.73	17.02
643	Indian Yellow Hue (Mixture)	4.97YR	5.73	13.52
686	Benzimidazolone Orange H5G	3.97YR	6.40	15.62
522	Perinone Orange	0.56YR	5.13	14.44
Reds – (Yellow Shade to Blue Shade)				
507	Cadmium Scarlet (Mixture)	9.31R	5.02	15.02
501	Cadmium Red	7.53R	4.60	15.02
585	Pyrrrole Scarlet	7.50R	4.47	14.72
588	Vermilion Hue (Naphthol AS-OL)	7.25R	4.37	15.04
524	Pyrrrole Red	6.19R	4.04	14.58
528	Quinacridone Yellow Red	5.64R	4.02	13.26
512	Naphthol Crimson (Naphthol ITR)	5.19R	3.61	11.96
508	Carmine Hue (Naphthol Red)	5.17R	3.52	12.28
502	Cadmium Red Deep	4.64R	3.60	12.30
525	Crimson Alizarin Hue (Mixture)	4.61R	3.63	10.78
537	Permanent Rose (Mixture)	3.08R	3.38	10.44
421	Primary Magenta (Mixture)	2.36R	3.22	9.00
429	Quinacridone Violet	1.47R	2.75	6.52
414	Quinacridone Magenta	1.44R	2.96	7.58
423	Quinacridone Maroon	1.28 R	2.95	7.20
410	Quinacridone Deep Purple	1.22R	2.88	6.86

MUNSELL VALUES TABLE

Colour Number	Colour Name	Hue	Value	Chroma
408	Deep Violet (Dioxazine Purple)	6.78RP	2.59	0.66
430	Permanent Violet (Mixture)	2.25RP	2.54	1.36
406	Cobalt Violet Hue (Mixture)	1.64RP	3.37	6.34
Blues – (Red Shade to Green Shade)				
419	Ultramarine Violet	3.03 P	2.58	4.10
123	Ultramarine	2.39P	2.47	7.34
126	Ultramarine Blue Green Shade	1.72P	2.45	6.84
140	Phthalo Blue Green Shade	0.33P	2.46	3.94
139	Phthalo Blue Red Shade	9.86PB	2.44	2.58
120	Primary Cyan (Mixture)	9.75PB	2.44	2.50
134	Prussian Blue Hue (Mixture)	9.42PB	2.40	1.58
109	Cobalt Blue	9.28PB	3.64	9.86
127	Indigo Hue (Mixture)	8.00PB	2.40	0.66
111	Coeruleum	3.94PB	4.74	9.16
160	Cobalt Chromite Blue Red Shade	0.97PB	3.83	6.40
121	Manganese Blue Hue (Mixture)	0.83PB	5.40	8.38
161	Cobalt Chromite Blue Green Shade	8.53B	3.51	5.10
154	Phthalo Turquoise (Mixture)	7.42B	2.54	1.34
106	Azure Blue (Mixture)	6.47B	5.29	7.82
153	Cobalt Turquoise Hue (Mixture)	2.53B	4.22	5.78
Colour Number	Colour Name	Hue	Value	Chroma
Greens – (Blue Shade to Yellow Shade)				
361	Phthalo Green	7.28BG	2.51	1.08
323	Cobalt Chromite Green	5.72BG	4.37	5.42
352	Hooker's Green (Mixture)	1.22BG	2.67	0.58
371	Rowney Emerald (Mixture)	4.58G	5.46	10.18
367	Opaque Oxide Of Chromium (Chromium Oxide Green)	7.56GY	4.60	4.84
375	Sap Green (Mixture)	7.56GY	3.26	3.20
379	Terre Verte Hue (Mixture)	7.11GY	3.17	1.44
308	Bright Green (Mixture)	6.72GY	6.56	15.92
388	Yellow Green (Mixture)	9.64Y	6.57	10.92

Colour Number	Colour Name	Hue	Value	Chroma
368	Pale Olive Green (Mixture)	8.94Y	5.37	9.66
Earths				
264	Vandyke Brown Hue (Mixture)	9.58Y	2.64	0.12
024	Buff Titanium (Unbleached Titanium White)	3.58Y	7.83	3.50
663	Yellow Ochre (Yellow Iron Oxide)	0.33Y	6.01	9.44
247	Raw Umber	0.19Y	2.94	0.88
667	Raw Sienna (Mixture)	6.94YR	5.06	7.52
641	Golden Ochre (Mixture)	5.78YR	5.95	13.72
578	Flesh Tint (Mixture)	4.11YR	6.64	5.54
223	Burnt Umber	2.42YR	2.74	1.04
527	Light Red Oxide	0.08YR	3.84	6.60
519	Rich Transparent Red Oxide (Red Iron Oxide)	9.33R	3.31	3.42
221	Burnt Sienna (Mixture)	8.86R	3.17	3.22
583	Venetian Red	6.92R	3.35	5.88
216	Quinacridone Burnt Orange	5.00R	2.74	3.26
Blacks and Whites				
065	Payne's Grey (Mixture)	1.67PB	2.47	0.18
034	Ivory Black	6.89B	2.36	0.20
035	Carbon Black	5.06B	2.51	0.24
036	Mars Black	3.25BG	2.51	0.02
064	Middle Grey (Mixture)	5.64Y	4.90	0.78
009	Titanium White	8.53Y	9.74	0.34
001	Zinc White	5.92Y	9.69	0.50
Metallics				
716	Metallic Black (Imit) (Mixture)	2.25PB	2.86	0.40
703	Pewter (Imit) (Mixture)	0.78B	7.67	1.64
702	Silver (Imit) (Mixture)	1.31BG	8.59	0.48
717	Metallic White (Imit) (Mixture)	5.36Y	9.36	0.90
708	Pale Gold (Imit) (Mixture)	2.44Y	7.47	10.36
707	Rich Gold (Imit) (Mixture)	0.50Y	6.70	9.38
704	Bronze (Imit) (Mixture)	7.36YR	6.92	6.06
230	Copper (Imit) (Mixture)	2.28YR	5.82	8.40

THE CRYLA ARTISTS' ACRYLIC RANGE OF COLOURS

OLD MASTERS, METALLIC AND PRIMARY COLOURS

Old Masters Colours

Historically there were a number of colours that were considered as essential to the old master painters. Over the years many of these colours have been phased out of common use due to the pigments used to create these colours being classed as unsafe or non-permanent/lightfast.

Daler-Rowney has recreated a selection of essential colours used by the old masters. Using blends of permanent, safe modern pigments, these hues have been re-created to match the original pure pigment colours produced by Daler-Rowney in the early 20th century. These historical hues in the Cryla Artists' Acrylic range allow artists to explore colours used by the old masters in a permanent, safe acrylic.

Metallic Colours

Within the Cryla Artists' Acrylic range there are 8 metallic colours, Pale Gold, Rich Gold, Copper, Bronze, Silver, Pewter, Black and White. These colours conform to the same exacting standards as all the other Cryla Artists' Acrylic colours and have the same heavy bodied characteristics.

All the metallic colours contain imitation metallic pigments and genuine metallic pigments. Genuine metallic pigments are not stable in acrylic colours, as they tend to tarnish in a relatively short period of time. Therefore coated mica flakes are used to give the impression of a genuine metallic pigment. The titanium coated mica flakes used in Cryla Artists' Acrylic give the colour a brilliant lustre similar to the genuine metallic colour.

Colour Name	Reason for Original Pigment Discontinuation
Naples Yellow Hue	Lead based pigment and classed as highly toxic
Indian Yellow Hue	Manufacturing process considered inhumane
Carmine Hue	Non-Permanent colour, fades rapidly
Crimson Alizarin Hue	Non-Permanent colour, fades rapidly
Prussian Blue Hue	Unreliable in acrylic colours
Indigo Hue	Non-Permanent colour, fades rapidly
Manganese Blue Hue	Pigment found to be highly toxic
Cobalt Violet Hue	Pigment found to be toxic
Sap Green	Non-Permanent colour, fades rapidly
Hooker's Green	Unreliable in acrylic colours
Terra Verte Hue	Pigment became unavailable
Vandyke Brown Hue	Unreliable pigment source and quality

Primary Colours (CMY)

The Cryla Artists' Acrylic range contains three primary colours that are Primary Yellow, Primary Magenta and Primary Cyan known as the "subtractive" Primaries.

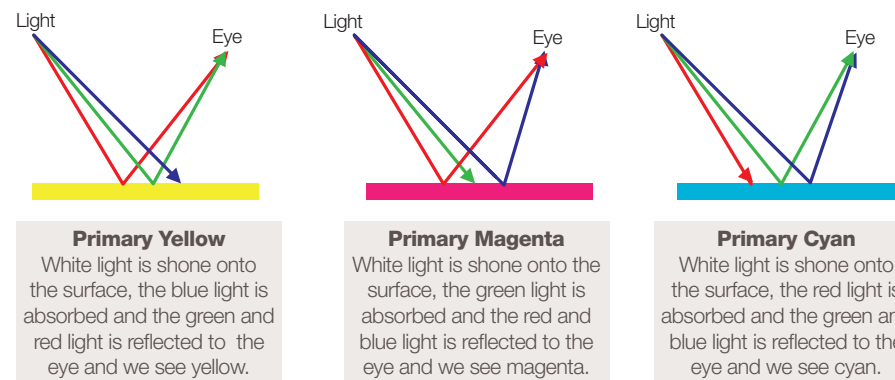
Primary colours are colours that in theory all other colours can be made just from mixing these three colours. If you mix all colours together you end up with black or in other words the absence of light as the colours have subtracted all the light. This theory comes from an understanding of how the human eye works and how we perceive colour.

The human eye is made up of rods and cones, rods are more sensitive than cones and detect light but they do not detect colour, hence when lighting is poor everything looks greyscale. For colour we are interested in the cones, the human eye has three type of cones that detect Red, Green and Blue Light. These colours of light are known as the

"additive" primary colours, add them all together and you will get white. If you look at a pixel on a TV or computer screen you will see each is made up of a yellow, green and blue dot.

When the cones in the eye are stimulated they send a signal to the brain that interprets it, this interpretation is done based on which cone is stimulated and by how much. i.e. if all the cones are stimulated a lot the brain interprets it as white, if only the red cone is stimulated and none of the others the brain interprets this colour as red etc. To explain this further we have to assume that sunlight or white light is made up of red, green and blue light.

When a primary colour is painted out it absorbs one of the additional primaries out of the white light and reflects back the other two to create the colour we see, therefore:



THE CRYLA ARTISTS' ACRYLIC RANGE OF COLOURS

PRIMARY AND CONTEMPORARY COLOURS

If we take this theory further and look at black and white you can see that white is all light and black is no light, therefore:



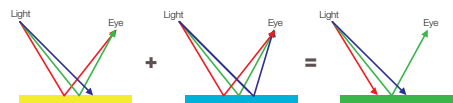
White

White light is shone onto the surface, all light is reflected to the eye and we see white.

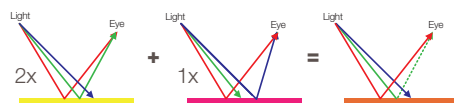
Black

White light is shone onto the surface, all light is absorbed by the surface and none is reflected back to the eye and we see black.

Now we will apply this theory to mixing colours, if we wish to create a green colour, we would mix Primary Yellow and Primary Cyan together in equal quantities. The Primary Yellow within the mix will absorb the blue light, the Primary Cyan in the mix will absorb the red light so the only light reflected is the green light and hence we get a green colour.



This also works if you mix all the combinations of primary colours. I.e. Primary Yellow + Primary Cyan = Green, Primary Yellow + Primary Magenta = Red and Primary Magenta + Primary Cyan = Blue. These three mixed colours are called the secondary colours.



All colours therefore can be mixed from these three primary colours by varying the amount of each colour that you put in the mix. For example if you wanted to create an orange colour you would mix Primary Yellow and Primary Magenta but not in equal quantities so you would have more Primary Yellow in the mix. In this mix all of the red would be reflected, all of the blue would be absorbed and some of the green would be reflected giving an orange colour.

This colour theory only works if you can produce primary colours that completely absorb and reflect the complete relevant areas of the colour spectrum. Also each primary colour has to have the same tinting strength as each other. Currently there is not a pigment that occurs in nature or can be produced in a synthetic laboratory that can produce these theoretical primary colours. Daler-Rowney has developed its primary colours in Cryla Artists' Acrylic to get as close as possible to the ideal parameters of a "true" primary colour. The primary colours are created by blending pigments together to create the closest possible colour, all of them are transparent (opacity rating 1-4) to aid colour mixing.

Contemporary Colours

The Cryla Artists' Acrylic range has a vibrant selection of 21st century trendy colours with the most modern Purest Pigments. These colours are a combination of brilliant and intense colours that complement the perfectly balanced range to satisfy the needs of acrylic painters.

Benzimidazolone Orange H5G
Pyrrole Scarlet
Quinacridone Yellow Red
Quinacridone Magenta
Quinacridone Maroon
Ultramarine Violet
Permanent Violet (Mixture)
Ultramarine Blue Green Shade
Cobalt Chromite Blue Red Shade
Cobalt Chromite Blue Green Shade
Cobalt Chromite Green

MIXING COLOURS

Mixing colours is a difficult skill to learn but becomes easier with experience and practice. Each artist creates their own basic palette of colours that normally consists of about 10 to 14 colours, these colours can vary depending on their painting style and overall look they are aiming for.

However there are some fundamental ideas when it comes to colour mixing that make it possible to create clean bright colour mixes rather than muddy browns.

To understand colour mixing you need to understand a little about the pigments that make up the colour. After all it is the pigment that gives the colour its colour and most of the characteristics. There are two main groups of pigments organic and inorganic:

Inorganic Pigments

These are pigments that have been used for centuries and are still popular with the traditional artists that paint landscapes and portraits etc. Inorganic pigments normally come from natural sources i.e. dug up from the earth and processed to give a pure pigment, however more are being synthetically made in laboratories. Siennas, Umbers and Ochres are known as the earth colours for this reason but Cobalts, Cadmiums and Coeruleum also fall into this category.

Inorganic pigments generally are opaque and reflect tones that can be found in nature all around us. They tend to be subtle and not intense. Using these colours on the mixing palette allows for soft warm and cool shades to be created and give the look of traditional paintings. It is easy to create muddy colours with inorganic pigments by mixing too many together.

Organic Pigments

Organic pigments tend to be newer pigments created and developed over the last fifty years or so. Organic pigments are based on complex carbon chemistry and are solely developed in a laboratory and then synthetically made. Long complex names such as Quinacridone, Phthalocyanine and Dioxazine come about from the chemical structure of the pigment.

Organic pigments are generally transparent and intense and can be said to have an unnatural look. Using these colours on the mixing palette creates bright clean intense colours that reflect tones of modern printing processes, plastics and tin can coatings. These colours normally need some care when mixing as some colours can be overpowering but clean colour mixes can be achieved.

Two other things need to be considered when colour mixing, these are the tinting strength of the colour and the colour shift from wet to dry colour.

Tinting Strength

The tinting strength of a colour is its ability to change the appearance of another colour when mixed with it. If only a small amount of colour is needed to change the hue of the other colour then it has a high tinting strength. If a lot of colour is needed to change the hue of the colour then it has a low tinting strength. Organic pigments generally have high tinting strengths so need to be used sparingly in colour mixing as they can easily overpower the mix. This is true with colours such as Phthalo blue that is a very powerful colour. Many artists choose Manganese Blue Hue instead as it contains the same pigment but is already reduced in strength so more easily controllable.

Colour Shift

As described earlier there is a colour shift from the wet to the dry colour, this is due to the acrylic co-polymer emulsion in the colour. When wet the emulsion is a milky white colour, this can give a colour an artificially light and opaque appearance in the wet state. When the colour dries the emulsion clears and becomes colourless and transparent allowing the true colour characteristics of the pigment to shine through. Therefore when colour mixing a small amount should always be painted out and left to dry to allow the true colour of the mix to show as in the wet state it will look more light and opaque.

Titanium or Zinc White

Why have two whites in a range? The reason for the two whites in the range is because they have different mixing properties and understanding the difference can greatly enhance your mixing experience. Titanium white is a very opaque white, when mixed with any colour it will make that colour opaque. However it will also greatly reduce the strength of the colour creating a pastel shade. This is ideal if you need to create a pastel shade but not if you're looking for a more subtle shade.

Zinc white is a less opaque white and has a lower tinting strength than titanium white. When mixed with colour it still reduces the colour down but to a lesser extent. Therefore the colour created does have increased opacity but tends not to be a pastel shade just lighter hue of the original colour.

Having taken all this into consideration we can now look at starting to mix clean colours from a basic palette. Colour is described in shades of a base colour i.e. if yellow is the base colour you have green shade yellows and red shade yellows, if red is the base colour then you have yellow shade reds and blue shade reds and so on. So if you look at a colour wheel you have the three primary colours (yellow, red and blue) and the shade is determined by which other colour it leans towards.



MIXING COLOURS

COLOUR MIXING TIPS

A basic palette is normally made up of two primary colours from the far ends of the shade spectrum. Therefore a green shade and a red shade yellow, a yellow shade and a blue shade red and a red shade and a green shade blue. The reason for choosing these colours is so that clean in-between shades can be obtained. If you mix a green shade yellow with a green shade blue you get a clean green colour, however if you mix a red shade yellow with a red shade blue you get a muddy green colour. Therefore a basic mixing beginner palette would be:

Hue	Inorganic Palette	Organic Palette
GSY	Bismuth Yellow	Lemon Yellow (Arylamide Yellow 10G)
RSY	Cadmium Yellow Deep	Golden Yellow (Mixture)
YSR	Cadmium Scarlet	Pyrrole Scarlet
BSR	Cadmium Red Deep	Quinacridone Deep Purple
RSB	Ultramarine	Phthalo Blue Red Shade
GSB	Coeruleum	Manganese Blue Hue

From the colours listed above you would be able to achieve almost every colour, the inorganic palette would give you subtle tones and the organic palette would give you intense mixes. However you can use combinations from both lists to obtain your basic palette as many artists do.

One point that may be seen from this is if you only need 10 to 14 colours to mix every colour why is there a range of 87 colours available in Cryla Artists' Acrylic. The simple reason is this, painting and colour mixing is an art form and not a science. Therefore each artist has their own preferential set of basic colours.

Also it is hard to mix a green for example to exactly the same colour every time. However you can be assured that the blended greens in the Cryla Artists' Acrylic range are always going to produce

the same colour every time and from one tube to the next. Sometimes you can require a colour for a specific type of work or a colour could inspire you to create a certain painting. For example a botanical painter would require more purples and violets in subtle shades for their paintings.

There are a few more colours that artists add to their basic palette as they greatly aid colour mixing these are:

Phthalo Green

A clean transparent green that makes a good base for all greens, when mixed with Lemon Yellow or Manganese Blue Hue it creates intense greens. Mixing Phthalo Green with Bismuth Yellow or Coeruleum creates more natural greens.

Yellow Ochre

Great for reducing the intensity of organic colours and creating warmth in a painting, hard to mix from other colours.

Burnt Sienna

Again hard to mix from other colours, this rich reddish earth colour helps reduce intensities and gives another level to greens.

Burnt Umber

Earthy natural brown colour that is hard to create from other colours helps cool colours and reduces intensities.

Payne's Grey

This is not black as such, the blue undertones make it ideal for shading and it reduces beautifully in white to give a superb range of natural greys.

Titanium and Zinc White

Titanium for highlighting and Zinc White for mixing.

COLOUR MIXING TIPS

- **Mix as few colours / pigments as possible. The more pigments that you mix together the more likely you are to create dirty colours, try and limit your colour mixes to mainly two colours with only a touch of a third. Be careful some colours are already a mixture of pigments so additional colour should be added to them sparingly.**
- **Mix similar colours together, mixing a red shade blue with a blue shade red is going to yield far better purples and violets than if you mix a yellow shade red and a green shade blue.**
- **Use earth colours to reduce the intensity and colour rather than blacks or whites.**

SURFACE PREPARATION

SURFACE PREPARATION

Cryla Artists' Acrylic colour will adhere to any semi-absorbent surface that is grease free and sound. However to ensure the longevity of your acrylic painting it is crucial that you follow a few simple steps to prepare the surface before applying colour.

Many surfaces come pre-prepared to paint acrylic onto, such as canvases, boards and papers. However you should read the usage instructions carefully as some surfaces such as Daler Board are oil primed only suitable for oil colours and not for acrylics.

Preparation:

Gesso Primer can be brush, roller or spray applied depending on the size of the surface you are painting or the tools that you have. Black Gesso Primer can be used the same way as the standard gesso primer if a black surface is required. Gesso Primer can be tinted by mixing in acrylic colour if a coloured surface is required, Gesso Primer does contain Titanium Dioxide pigment so only pastel shades can be obtained.

Masonry / Coarse Brickwork

Very rough and absorbent surfaces like brick should first be brushed over with a wire brush to remove all loose material. The surface should then be washed with mild soap and water to remove any dust and grease and then rinsed. While the surface is still damp apply a coat of Gesso Primer and leave to dry, once dry apply a second coat of gesso primer at right angles to the first. This will seal the brickwork to stop the moisture and acrylic being sucked out of the acrylic colours and leave you a white surface to paint on.

Hardboard / Masonite

The shiny surface of the hardboard should be lightly sanded to give the surface some tooth for the gesso to adhere to. Once sanded wash off the dust and while still damp apply a coat of Gesso Primer. If a whiter smoother surface is required lightly sand the primed surface and apply a second coat of primer. If a very smooth surface is required this top layer of gesso can also be lightly sanded again.

Plaster / Plaster Board

Brush over the surface to remove any loose material and ensure the surface is sound. Wash the surface in mild soap and water to remove dust and grease then rinse. While the surface is still damp apply a coat of Gesso Primer. If the surface is very absorbent apply a first coat of Gesso Primer diluted by 5 parts of primer to 1 of water. Subsequent layers of undiluted primer can then be applied.

Raw Canvas / Canvas Panels

Rolled raw canvas should first be stretched over a frame before any priming takes place. Once stretched the Gesso Primer can be applied directly to the surface.

MURAL PAINTING

Cryla Artists' Acrylic colour is an excellent medium for creating murals both inside and outside. The attributes of Cryla Artists' Acrylic means that it adheres well to the surface and are water resistant and permanent when dry. Cryla Artists' Acrylic exhibits excellent weathering resistance and the high degree of lightfastness from the pigments ensures a mural painted with Cryla Artists' Acrylic will last indoors and out.

When painting a mural there are certain procedures to follow that will ensure that your mural will last. The surface should be well prepared as detailed in the surface preparation section of this booklet. If painting the mural outside it must be done on a warm day. Acrylic colours dry through evaporation of water then coalesce to create a strong paint film. The colour has to be fairly warm to coalesce properly, and the evaporation of water from the colour also cools the painting surface.

A good solution to this is to paint on a board inside and then fix it to the wall outside. Marine Plywood is the best material to use when painting a mural that is going to be displayed outside. The plywood should be primed both front and back and around the sides to fully encapsulate the plywood. Once this is done the Cryla Artists' Acrylic colour can be painted onto the surface in your usual technique.

The mural is then complete and can be hung outside, if you require further protection for your work it can be varnished. Normal artist's varnishes cannot be used for this type of application as they are designed to be used indoors and are soft. Instead an anti-graffiti coating should be applied if this is required or a polyurethane based varnish should be used. These types of varnish can be found in hardware stores and are sometimes known as yacht varnishes. When choosing a varnish to use ensure that it is a non-yellowing variety and it can be applied to acrylics. These varnishes are normally solvent based so ensure that the colour has been drying for at least 24 hours before application. When varnishing the mural again ensure that the back and the side are also varnished. Once the varnish has been applied it cannot be removed so ensure you are happy with your mural before doing this.

COLOUR CHART

<p>637 NICKEL TITANATE YELLOW *** OPACITY 8 SERIES B</p>	<p>629 BISMUTH YELLOW (Vanadate) *** OPACITY 7 SERIES C</p>	<p>611 CADMIUM YELLOW PALE *** OPACITY 7 SERIES C</p>	<p>410 QUINACRIDONE DEEP PURPLE *** OPACITY 4 SERIES C</p>	<p>429 QUINACRIDONE VIOLET *** OPACITY 8 SERIES C</p>	<p>423 QUINACRIDONE MAROON *** OPACITY 6 SERIES D</p>
<p>651 LEMON YELLOW (Arylide Yellow 10G) *** OPACITY 2 SERIES B</p>	<p>675 PRIMARY YELLOW (Mixture) *** OPACITY 2 SERIES B</p>	<p>612 CADMIUM YELLOW *** OPACITY 9 SERIES C</p>	<p>406 COBALT VIOLET HUE (Mixture) *** OPACITY 11 SERIES D</p>	<p>419 ULTRAMARINE VIOLET *** OPACITY 7 SERIES A</p>	<p>430 PERMANENT VIOLET (Mixture) *** OPACITY 7 SERIES C</p>
<p>635 NAPLES YELLOW HUE (Mixture) *** OPACITY 9 SERIES B</p>	<p>671 PERMANENT YELLOW (Arylamide Mixture) *** OPACITY 2 SERIES B</p>	<p>613 CADMIUM YELLOW DEEP (Mixture) *** OPACITY 9 SERIES C</p>	<p>408 DEEP VIOLET (Dioxazine Purple) *** OPACITY 7 SERIES C</p>	<p>123 ULTRAMARINE *** OPACITY 6 SERIES A</p>	<p>126 ULTRAMARINE BLUE GREEN SHADE *** OPACITY 6 SERIES B</p>
<p>643 INDIAN YELLOW HUE (Mixture) *** OPACITY 4 SERIES B</p>	<p>632 GOLDEN YELLOW (Mixture) *** OPACITY 4 SERIES B</p>	<p>615 CADMIUM ORANGE *** OPACITY 9 SERIES C</p>	<p>109 COBALT BLUE **** OPACITY 10 SERIES C</p>	<p>139 PHTHALO BLUE RED SHADE *** OPACITY 7 SERIES B</p>	<p>140 PHTHALO BLUE GREEN SHADE *** OPACITY 6 SERIES A</p>
<p>686 BENZIMIDAZOLONE ORANGE H5G *** OPACITY 6 SERIES C</p>	<p>522 PERINONE ORANGE *** OPACITY 3 SERIES C</p>	<p>507 CADMIUM SCARLET (Mixture) *** OPACITY 10 SERIES C</p>	<p>120 PRIMARY CYAN (Mixture) *** OPACITY 4 SERIES B</p>	<p>134 PRUSSIAN BLUE HUE (Mixture) *** OPACITY 10 SERIES A</p>	<p>127 INDIGO HUE (Mixture) *** OPACITY 10 SERIES B</p>
<p>501 CADMIUM RED *** OPACITY 10 SERIES D</p>	<p>585 PYRROLE SCARLET *** OPACITY 9 SERIES D</p>	<p>588 VERMILION HUE (Naphthol AS-OL) *** OPACITY 5 SERIES B</p>	<p>111 COERULEUM **** OPACITY 7 SERIES B</p>	<p>160 COBALT CHROMITE BLUE RED SHADE **** OPACITY 11 SERIES D</p>	<p>161 COBALT CHROMITE BLUE GREEN SHADE **** OPACITY 11 SERIES D</p>
<p>524 PYRROLE RED *** OPACITY 9 SERIES C</p>	<p>528 QUINACRIDONE YELLOW RED *** OPACITY 3 SERIES D</p>	<p>508 CARMINE HUE (Naphthol Red) *** OPACITY 8 SERIES C</p>	<p>121 MANGANESE BLUE HUE (Mixture) *** OPACITY 11 SERIES B</p>	<p>106 AZURE BLUE (Mixture) *** OPACITY 10 SERIES A</p>	<p>153 COBALT TURQUOISE HUE (Mixture) *** OPACITY 9 SERIES A</p>
<p>512 NAPHTHOL CRIMSON (Naphthol ITR) *** OPACITY 3 SERIES B</p>	<p>502 CADMIUM RED DEEP *** OPACITY 10 SERIES C</p>	<p>525 CRIMSON ALIZARIN HUE (Mixture) *** OPACITY 5 SERIES B</p>	<p>323 COBALT CHROMITE GREEN **** OPACITY 11 SERIES B</p>	<p>154 PHTHALO TURQUOISE (Mixture) *** OPACITY 8 SERIES A</p>	<p>361 PHTHALO GREEN *** OPACITY 6 SERIES A</p>
<p>537 PERMANENT ROSE (Mixture) *** OPACITY 4 SERIES C</p>	<p>421 PRIMARY MAGENTA (Mixture) *** OPACITY 4 SERIES B</p>	<p>414 QUINACRIDONE MAGENTA *** OPACITY 4 SERIES C</p>	<p>352 HOOKER'S GREEN (Mixture) *** OPACITY 8 SERIES A</p>	<p>379 TERRE VERTE HUE (Mixture) *** OPACITY 9 SERIES A</p>	<p>375 SAP GREEN (Mixture) *** OPACITY 8 SERIES A</p>

COLOUR CHART

 <p>371 ROWNEY EMERALD (Mixture) *** OPACITY 11 SERIES B</p>	 <p>367 OPAQUE OXIDE OF CHROMIUM (Chromium Oxide Green) **** OPACITY 12 SERIES A</p>	 <p>368 PALE OLIVE GREEN (Mixture) *** OPACITY 7 SERIES B</p>	 <p>703 PEWTER (Imit) (Mixture) *** OPACITY 7 SERIES D</p>	 <p>708 PALE GOLD (Imit) (Mixture) *** OPACITY 5 SERIES C</p>	 <p>707 RICH GOLD (Imit) (Mixture) *** OPACITY 6 SERIES C</p>
 <p>388 YELLOW GREEN (Mixture) *** OPACITY 10 SERIES B</p>	 <p>308 BRIGHT GREEN (Mixture) *** OPACITY 5 SERIES B</p>	 <p>024 BUFF TITANIUM (Unbleached Titanium White) *** OPACITY 10 SERIES A</p>	 <p>704 BRONZE (Imit) (Mixture) *** OPACITY 7 SERIES C</p>	 <p>230 COPPER (Imit) (Mixture) *** OPACITY 7 SERIES A</p>	 <p>716 METALLIC BLACK (Imit) (Mixture) *** OPACITY 10 SERIES B</p>
 <p>663 YELLOW OCHRE (Yellow Iron Oxide) **** OPACITY 7 SERIES A</p>	 <p>667 RAW SIENNA (Mixture) **** OPACITY 7 SERIES A</p>	 <p>641 GOLDEN OCHRE (Mixture) *** OPACITY 3 SERIES B</p>	<p>**** Permanent *** Normally Permanent A, B, C, D refers to price series Transparent (opacity rating 1 to 4) Semi-Transparent (opacity rating 5-8) Opaque (opacity rating 9-12)</p>		
 <p>578 FLESH TINT (Mixture) *** OPACITY 11 SERIES A</p>	 <p>527 LIGHT RED OXIDE **** OPACITY 10 SERIES A</p>	 <p>519 RICH TRANSPARENT RED OXIDE (Red Iron Oxide) **** OPACITY 4 SERIES A</p>			
 <p>221 BURNT SIENNA (Mixture) **** OPACITY 7 SERIES A</p>	 <p>583 VENETIAN RED **** OPACITY 9 SERIES A</p>	 <p>216 QUINACRIDONE BURNT ORANGE *** OPACITY 7 SERIES C</p>			
 <p>223 BURNT UMBER **** OPACITY 7 SERIES A</p>	 <p>264 VANDYKE BROWN HUE (Mixture) **** OPACITY 11 SERIES A</p>	 <p>247 RAW UMBER **** OPACITY 7 SERIES B</p>			
 <p>064 MIDDLE GREY (Mixture) *** OPACITY 12 SERIES A</p>	 <p>065 PAYNE'S GREY (Mixture) *** OPACITY 11 SERIES A</p>	 <p>034 IVORY BLACK **** OPACITY 11 SERIES A</p>			
 <p>035 CARBON BLACK **** OPACITY 12 SERIES A</p>	 <p>036 MARS BLACK **** OPACITY 12 SERIES A</p>	 <p>009 TITANIUM WHITE *** OPACITY 11 SERIES A</p>			
 <p>001 ZINC WHITE *** OPACITY 9 SERIES A</p>	 <p>717 METALLIC WHITE (Imit) (Mixture) *** OPACITY 4 SERIES B</p>	 <p>702 SILVER (Imit) (Mixture) *** OPACITY 6 SERIES D</p>			

SPECIFICATIONS

Colour #	Colour Name	Common Name	Chemical Class	CI Name	CI Number	Class	ASTM	Conforms D-5098	Light-fastness	Opacity	Series	Munsell Values- Hue	Munsell Values- Value	Munsell Values- Chroma
637	Nickel Titanate Yellow	Nickel Titanate Yellow	Oxides of Nickel, Antimony and Titanium	PY53	77788	Synthetic Inorganic	I	Yes	***	8	B	7.71Y	9.00	12.38
629	Bismuth Yellow (Vanadate)	Bismuth Vanadate Yellow	Bismuth Vanadate	PY184	Pigment Yellow 184	Synthetic Organic	I	Yes	***	7	C	6.25Y	9.15	18.74
611	Cadmium Yellow Pale	Cadmium Yellow Pale	Concentrated Cadmium Zinc Sulphide	PY35	77205	Synthetic Inorganic	I	Yes	***	7	C	6.03Y	9.14	20.88
651	Lemon Yellow (Arylide Yellow 10G)	Arylide Yellow 10G	Arylide Yellow	PY3	11710	Synthetic Organic	II	Yes	***	2	B	5.53Y	8.73	19.32
675	Primary Yellow (Mixture)	Arylide Yellow 10G / Arylide Yellow 5GX	Arylide Yellow / Arylide Yellow	PY3 / PY74 (LF)	11710 / 11741	Synthetic Organic	II	Yes	***	2	B	3.94Y	8.68	20.12
612	Cadmium Yellow	Cadmium Yellow	Concentrated Cadmium Zinc Sulphide	PY35	77205	Synthetic Inorganic	I	Yes	***	9	C	3.42Y	8.62	20.42
635	Naples Yellow Hue (Mixture)	Titanium White / Diarylie Yellow HR70 / Benzimidazolone Orange H5G	Titanium Dioxide / Diarylie Yellow / Monoacetolone	PW6 / PY83 / PO62	77891 / 21108 / 11775	Synthetic Inorganic / Synthetic Organic	I	Yes	***	9	B	9.97YR	8.60	10.24
671	Permanent Yellow (Arylamide Mixture)	Arylide Yellow GX / Benzimidazolone Orange H5G	Arylide Yellow / Monoacetolone	PY73 / PO62	11738 / 11775	Synthetic Organic	I	Yes	***	2	B	1.97Y	7.92	18.70
613	Cadmium Yellow Deep (Mixture)	Cadmium Yellow / Cadmium Orange	Concentrated Cadmium Zinc Sulphide / Concentrated Cadmium Sulpho-Selenide	PY35 / PO20	77205 / 77202	Synthetic Inorganic	I	Yes	***	9	C	9.75 YR	7.74	18.16
643	Indian Yellow Hue (Mixture)	Arylide Yellow GX / Quinacridone Burnt Orange	Arylide Yellow / Quinacridone	PY73 / PR206	11738 / N/A	Synthetic Organic	I	Yes	***	4	B	4.97YR	5.73	13.52
632	Golden Yellow (Mixture)	Arylide Yellow GX / Benzimidazolone Orange H5G	Arylide Yellow / Monoacetolone	PY73 / PO62	11738 / 11775	Synthetic Organic	I	Yes	***	4	B	7.19YR	7.08	17.56
615	Cadmium Orange	Cadmium Orange	Concentrated Cadmium Sulpho-Selenide	PO20	77202	Synthetic Inorganic	I	Yes	***	9	C	5.61YR	6.73	17.02
686	Benzimidazolone Orange H5G	Benzimidazolone Orange H5G	Monoacetolone	PO62	11775	Synthetic Organic	I	Yes	***	6	C	3.97YR	6.40	15.62
522	Perinone Orange	Perinone Orange	Perinone	PO43 (DL)	71105	Synthetic Organic	I	Yes	***	3	C	0.56YR	5.13	14.44
507	Cadmium Scarlet (Mixture)	Cadmium Red / Cadmium Orange	Concentrated Cadmium-Selene Sulphide / Concentrated Cadmium Sulpho-Selenide	PR108 / PO20	77202.1 / 77202	Synthetic Inorganic	I	Yes	***	10	C	9.31R	5.02	15.02
501	Cadmium Red	Cadmium Red	Concentrated Cadmium-Selene Sulphide	PR108	77202.1	Synthetic Inorganic	I	Yes	***	10	D	7.53R	4.60	15.02
585	Pyrrrole Scarlet	Pyrrrole Scarlet	Pyrrlopyrrol	PR255	N/A	Synthetic Organic	I	Yes	***	9	D	7.50R	4.47	14.72
588	Vermilion Hue (Naphthol AS-OL)	Naphthol AS-OL	Naphthol AS-OL	PR9	12460	Synthetic Organic	I	Yes	***	5	B	7.25R	4.37	15.04
524	Pyrrrole Red	Pyrrrole Red	Pyrrlopyrrol	PR254	73902	Synthetic Organic	I	Yes	***	9	C	6.19R	4.04	14.58
528	Quinacridone Yellow Red	Quinacridone Yellow Red	Quinacridone Red	PR209	73905	Synthetic Organic	I	Yes	***	3	D	5.64R	4.02	13.26
508	Carmine Hue (Naphthol Red)	Naphthol Red	Naphthol Carbamide	PR170	12475	Synthetic Organic	I	Yes	***	8	C	5.17R	3.52	12.28
512	Naphthol Crimson (Naphthol ITR)	Naphthol ITR	Naphthol ITR	PR5	12490	Synthetic Organic	II	Yes	***	3	B	5.19R	3.61	11.96
502	Cadmium Red Deep	Cadmium Red Deep	Concentrated Cadmium-Selene Sulphide	PR108	77202.1	Synthetic Inorganic	I	Yes	***	10	C	4.64R	3.60	12.30
525	Crimson Alizarin Hue (Mixture)	Quinacridone Red / Quinacridone Yellow Red	Quinacridone Red / Quinacridone Red	PV19 / PR209	73900 / 73905	Synthetic Organic	I	Yes	***	5	B	4.61R	3.63	10.78

SPECIFICATIONS

Colour #	Colour Name	Common Name	Chemical Class	CI Name	CI Number	Class	ASTM	Conforms D-5098	Light-fastness	Opacity	Series	Munsell Values- Hue	Munsell Values- Value	Munsell Values- Chroma
537	Permanent Rose (Mixture)	Quinacridone Red / Quinacridone Red	Quinacridone Red / Quinacridone	PV19 / PR122	73900 / 73915	Synthetic Organic	I	Yes	***	4	C	3.08R	3.38	10.44
421	Primary Magenta (Mixture)	Quinacridone Red / Quinacridone Red	Quinacridone Red / Quinacridone	PV19 / PR122	73900 / 73915	Synthetic Organic	I	Yes	***	4	B	2.36R	3.22	9.00
410	Quinacridone Deep Purple	Quinacridone Deep Purple	Quinacridone	PR122	73916	Synthetic Organic	I	Yes	***	4	C	1.22R	2.88	6.86
429	Quinacridone Violet	Quinacridone Violet	Quinacridone Violet B	PV19 (DL)	73900	Synthetic Organic	I	Yes	***	7	C	1.47R	2.75	6.52
414	Quinacridone Magenta	Quinacridone Magenta	Quinacridone Magenta	PR122	73915	Synthetic Organic	I	Yes	***	4	C	1.44R	2.96	7.58
423	Quinacridone Maroon	Quinacridone Violet	Quinacridone Violet B	PR122	73915	Synthetic Organic	I	Yes	***	8	C	1.28R	2.95	7.20
406	Cobalt Violet Hue (Mixture)	Lithopone / Quinacridone Red / Dioxazine Purple	Zinc Sulphide / Quinacridone / Carbazole Dioxazine	PW5 / PR122 / PV23 (RS)	77115 / 73915 / 51319	Synthetic Inorganic / Synthetic Organic		No	***	11	D	1.64RP	3.37	6.34
419	Ultramarine Violet	Ultramarine Violet	Sodium Alumino-Sulphosilicates	PV15	77007	Synthetic Inorganic	I	Yes	***	7	A	3.03 P	2.58	4.10
408	Deep Violet (Dioxazine Purple)	Dioxazine Purple	Carbazole Dioxazine	PV23 (RS)	51319	Synthetic Organic	II	Yes	***	7	C	6.78RP	2.59	0.66
430	Permanent Violet (Mixture)	Quinacridone Magenta / Dioxazine Purple	Quinacridone Magenta / Carbazole Dioxazine	PR122 / PV23	73915 / 51319	Synthetic Organic	I	Yes	***	6	D	2.25RP	2.54	1.36
123	Ultramarine	Ultramarine Blue	Sodium Alumino-Sulphosilicates	PB29	77007	Synthetic Inorganic	I	Yes	***	6	A	2.39P	2.47	7.34
126	Ultramarine Blue Green Shade	Ultramarine Blue	Sodium Alumino-Sulphosilicates	PB29	77007	Synthetic Inorganic	I	Yes	***	6	B	1.72P	2.45	6.84
109	Cobalt Blue	Cobalt Blue	Cobalt Aluminate	PB28	77346	Synthetic Inorganic	I	Yes	****	10	C	9.28PB	3.64	9.86
139	Phthalo Blue Red Shade	Phthalo Blue	Copper Phthalocyanine	PB15	74160	Synthetic Organic	I	Yes	***	7	B	9.86PB	2.44	2.58
140	Phthalo Blue Green Shade	Phthalo Blue	Copper Phthalocyanine	PB15	74160	Synthetic Organic	I	Yes	***	6	A	0.33P	2.46	3.94
120	Primary Cyan (Mixture)	Phthalo Blue / Phthalo Green	Copper Phthalocyanine / Chlorinated Copper Phthalocyanine	PB15 / PG7	74160 / 74260	Synthetic Organic	I	Yes	***	4	B	9.75PB	2.44	2.50
134	Prussian Blue Hue (Mixture)	Ultramarine Blue / Phthalo Blue / Mars Black	Sodium Alumino-Sulphosilicates / Copper Phthalocyanine / Synthetic Black Iron Oxide	PB29 / PB15 / PBk11	77007 / 74160 / 77499	Synthetic Organic / Synthetic Inorganic	I	Yes	***	10	A	9.42PB	2.40	1.58
127	Indigo Hue (Mixture)	Phthalo Blue / Quinacridone Violet / Carbon Black	Copper Phthalocyanine / Quinacridone Violet B / Amorphous Carbon	PB15 / PV19 (DL) / PBk7	74160 / 73900 / 77266	Synthetic Organic / Natural Inorganic	I	Yes	***	10	B	8.00PB	2.40	0.66
111	Coeruleum	Cerulean Blue	Cobalt Stannate	PB35	77368	Synthetic Inorganic	I	Yes	****	7	B	3.94PB	4.74	9.16
160	Cobalt Chromite Blue Red Shade	Cobalt Chromite Blue Red Shade	Cobalt Chromite	PB36	77343	Synthetic Inorganic	I	Yes	****	11	D	0.97PB	3.83	6.40
161	Cobalt Chromite Blue Green Shade	Cobalt Chromite Blue Green Shade	Cobalt Chromite	PB36	77343	Synthetic Inorganic	I	Yes	****	11	D	8.53B	3.51	5.10
121	Manganese Blue Hue (Mixture)	Lithopone / Phthalo Blue	Zinc Sulphide / Copper Phthalocyanine	PW5 / PB15	77115 / 74160	Synthetic Inorganic / Synthetic Organic		No	***	11	B	0.83PB	5.40	8.38
106	Azure Blue (Mixture)	Phthalo Blue / Phthalo Green / Lithopone	Copper Phthalocyanine / Chlorinated Copper Phthalocyanine / Zinc Sulphide	PB15 / PG7 / PW5	74160 / 74260 / 77115	Synthetic Organic / Synthetic Inorganic		No	***	10	A	6.47B	5.29	7.82

SPECIFICATIONS

Colour #	Colour Name	Common Name	Chemical Class	CI Name	CI Number	Class	ASTM	Conforms D-5098	Light-fastness	Opacity	Series	Munsell Values- Hue	Munsell Values- Value	Munsell Values- Chroma
153	Cobalt Turquoise Hue (Mixture)	Phthalo Blue / Phthalo Green / Lithopone	Copper Phthalocyanine / Chlorinated Copper Phthalocyanine / Zinc Sulphide	PB15 / PG7 / PW5	74160 / 74260 / 77115	Synthetic Organic / Synthetic Inorganic		No	***	9	A	2.53B	4.22	5.78
323	Cobalt Chromite Green	Cobalt Chromite Green	Cobalt Chromite	PB36	77343	Synthetic Inorganic	I	Yes	****	11	B	5.72BG	4.37	5.42
154	Phthalo Turquoise (Mixture)	Phthalo Blue / Phthalo Green	Copper Phthalocyanine / Chlorinated Copper Phthalocyanine	PB15 / PG7	74160 / 74260	Synthetic Organic	I	Yes	***	8	A	7.42B	2.54	1.34
361	Phthalo Green	Phthalo Green	Chlorinated Copper Phthalocyanine	PG7	74260	Synthetic Organic	I	Yes	***	6	A	7.28BG	2.51	1.08
352	Hooker's Green (Mixture)	Phthalo Green / Red Iron Oxide	Chlorinated Copper Phthalocyanine / Synthetic Red Iron Oxide	PG7 / PR101	74260 / 77491	Synthetic Organic	I	Yes	***	8	A	1.22BG	2.67	0.58
379	Terre Verte Hue (Mixture)	Raw Umber / Yellow Iron Oxide / Phthalo Green	Natural Iron Oxide Containing Manganese / Synthetic Hydrated Iron Oxide / Chlorinated Copper Phthalocyanine	PBr7 / PY42 / PG7	77492 / 77492 / 74260	Natural Inorganic / Synthetic Organic	I	Yes	***	9	A	7.11GY	3.17	1.44
375	Sap Green (Mixture)	Arylide Yellow GX / Phthalo Green / Red Iron Oxide	Arylide Yellow / Chlorinated Copper Phthalocyanine / Synthetic Red Iron Oxide	PY73 / PG7 / PR101	11738 / 74260 / 77491	Synthetic Organic	I	Yes	***	8	A	7.56GY	3.26	3.20
371	Rowney Emerald (Mixture)	Titanium White / Phthalo Green / Arylide Yellow 10G	Titanium Dioxide / Chlorinated Copper Phthalocyanine / Arylide Yellow	PW6 / PG7 / PY3	77891 / 74260 / 11710	Synthetic Inorganic / Synthetic Organic	II	Yes	***	11	B	4.58G	5.46	10.18
367	Opaque Oxide Of Chromium (Chromium Oxide Green)	Chromium Oxide Green	Anhydrous Chromium Sesquioxide	PG17	77288	Synthetic Inorganic	I	Yes	****	12	A	7.56GY	4.60	4.84
368	Pale Olive Green (Mixture)	Phthalo Green / Nickel Dioxine Yellow	Chlorinated Copper Phthalocyanine / Dioxine Yellow Nickel Complex	PG7 / PY153	74260 / N/A	Synthetic Organic	I	Yes	***	7	B	8.94Y	5.37	9.66
388	Yellow Green (Mixture)	Arylide Yellow 5GX / Titanium White / Chromium Oxide Green	Arylide Yellow / Titanium Dioxide / Anhydrous Chromium Sequioxide	PY74 (LF) / PW6 / PG17	11741 / 77891 / 77288	Synthetic Organic / Synthetic Inorganic	I	Yes	***	10	B	9.64Y	6.57	10.92
308	Bright Green (Mixture)	Phthalo Green / Arylide Yellow 10G	Chlorinated and Brominated Phthalocyanine / Arylide Yellow	PG36 / PY3	74265 / 11710	Synthetic Organic	II	Yes	***	5	B	6.72GY	6.56	15.92
024	Buff Titanium (Unbleached Titanium White)	Titanium White	Titanium Dioxide	PW6	77891	Synthetic Inorganic	I	Yes	***	10	A	3.58Y	7.83	3.50
663	Yellow Ochre (Yellow Iron Oxide)	Yellow Iron Oxide	Synthetic Hydrated Iron Oxide	PY42	77492	Synthetic Inorganic	I	Yes	****	7	A	0.33Y	6.01	9.44
667	Raw Sienna (Mixture)	Yellow Iron Oxide / Red Iron Oxide / Bone Black	Synthetic Hydrated Iron Oxide / Synthetic Red Iron Oxide / Amorphous Carbon Produced By Charring Animal Bones	PY42 / PR101 / PBk9	77492 / 77491 / 77267	Synthetic Inorganic / Synthetic Organic / Natural Inorganic	I	Yes	****	7	A	6.94YR	5.06	7.52
641	Golden Ochre (Mixture)	Nickel Dioxine Yellow / Venetian Red	Dioxine Yellow Nickel Complex / Synthetic Iron Oxide (Yellowish Hue)	PY153 / PR101	N/A / 77491	Synthetic Organic	I	Yes	***	3	B	5.78YR	5.95	13.72
578	Flesh Tint (Mixture)	Yellow Iron Oxide / Indian Red / Titanium White	Synthetic Hydrated Iron Oxide / Synthetic Red Iron Oxide (Bluish Hue) / Titanium Dioxide	PY42 / PR101 / PW6	77492 / 77491 / 77891	Synthetic Inorganic / Synthetic Organic	I	Yes	***	11	A	4.11YR	6.64	5.54
527	Light Red Oxide	Light Red Oxide	Synthetic Red Iron Oxide (Yellowish Hue)	PR101	77491	Synthetic Inorganic	I	Yes	****	10	A	0.08YR	3.84	6.60
519	Rich Transparent Red Oxide (Red Iron Oxide)	Red Iron Oxide	Synthetic Red Iron Oxide	PR101	77491	Synthetic Inorganic	I	Yes	****	4	A	9.33R	3.31	3.42

SPECIFICATIONS

Colour #	Colour Name	Common Name	Chemical Class	CI Name	CI Number	Class	ASTM	Conforms D-5098	Light-fastness	Opacity	Series	Munsell Values- Hue	Munsell Values- Value	Munsell Values- Chroma
221	Burnt Sienna (Mixture)	Red Iron Oxide / Quinacridone Burnt Orange / Bone Black	Synthetic Red Iron Oxide / Quinacridone / Amorphous Carbon Produced By Charring Animal Bones	PR101 / PR206 / PBk 9	77491 / N/A / 77267	Synthetic Inorganic / Synthetic Organic / Natural Inorganic	I	Yes	****	7	A	8.86R	3.17	3.22
583	Venetian Red	Venetian Red	Synthetic Iron Oxide (Yellowish Hue)	PR101	77491	Synthetic Inorganic	I	Yes	****	9	A	6.92R	3.35	5.88
216	Quinacridone Burnt Orange	Quinacridone Burnt Orange	Quinacridone	PR206	N/A	Synthetic Organic	I	Yes	***	7	C	5.00R	2.74	3.26
223	Burnt Umber	Burnt Umber	Calcined Natural Iron Oxide Containing Manganese	PBr7	77492	Natural Inorganic	I	Yes	****	7	A	2.42YR	2.74	1.04
264	Vandyke Brown Hue (Mixture)	Red Iron Oxide / Bone Black	Synthetic Red Iron Oxide / Amorphous Carbon Produced By Charring Animal Bones	PR101 / PBk9	77491 / 77267	Synthetic Inorganic / Natural Inorganic	I	Yes	****	11	A	9.58Y	2.64	0.12
247	Raw Umber	Raw Umber	Natural Iron Oxide Containing Manganese	PBr7	77492	Natural Inorganic	I	Yes	****	7	B	0.19Y	2.94	0.88
064	Middle Grey (Mixture)	Titanium White / Carbon Black / Raw Umber	Titanium Dioxide / Nearly Pure Amorphous Carbon / Natural Iron Oxide Containing Manganese	PW6 / PBk7 / PBr7	77891 / 77266 / 77492	Synthetic Inorganic / Natural Inorganic	I	Yes	***	12	A	5.64Y	4.90	0.78
065	Payne's Grey (Mixture)	Ultramarine Blue / Mars Black	Sodium Alumino-Sulphosilicates / Synthetic Black Iron Oxide	PB29 / PBk11	77007 / 77499	Synthetic Inorganic	I	Yes	***	11	A	1.67PB	2.47	0.18
034	Ivory Black	Bone Black	Amorphous Carbon Produced By Charring Animal Bones	PBk9	77267	Natural Inorganic	I	Yes	****	11	A	6.89B	2.36	0.20
035	Carbon Black	Carbon Black	Nearly Pure Amorphous Carbon	PBk7	77492	Natural Inorganic	I	Yes	****	12	A	5.06B	2.51	0.24
036	Mars Black	Mars Black	Synthetic Black Iron Oxide	PBk11	77499	Synthetic Inorganic	I	Yes	****	12	A	3.25BG	2.52	0.02
009	Titanium White	Titanium White	Titanium Dioxide	PW6	77891	Synthetic Inorganic	I	Yes	***	11	A	8.53Y	9.74	0.34
001	Zinc White	Lithopone	Zinc Sulphide	PW5	77115	Synthetic Inorganic		No	***	9	A	5.92Y	9.69	0.50
717	Metallic White (Imit) (Mixture)	Titanium Dioxide Coated Mica	Titanium Dioxide Coated Mica	PW6	77891	Synthetic Inorganic	I	Yes	***	4	B	5.36Y	9.36	0.90
702	Silver (Imit) (Mixture)	Titanium Dioxide Coated Mica / Carbon Black / Phthalo Blue	Titanium Dioxide Coated Mica / Nearly Pure Amorphous Carbon / Copper Phthalocyanine	PW6 / PBk7 / PB15	77891 / 77492 / 74160	Synthetic Inorganic / Synthetic Organic	I	Yes	***	6	D	1.31BG	8.59	0.48
703	Pewter (Imit) (Mixture)	Titanium Dioxide Coated Mica / Carbon Black / Phthalo Blue	Titanium Dioxide Coated Mica / Nearly Pure Amorphous Carbon / Copper Phthalocyanine	PW6 / PBk7 / PB15	77891 / 77492 / 74160	Synthetic Inorganic / Synthetic Organic	I	Yes	***	7	D	0.78B	7.67	1.64
708	Pale Gold (Imit) (Mixture)	Titanium Dioxide Coated Mica / Red Iron Oxide / Diarylide Yellow HR70	Titanium Dioxide Coated Mica / Synthetic Red Iron Oxide / Diarylide Yellow	PW6 / PR101 / PY83	77891 / 77491 / 21108	Synthetic Inorganic / Synthetic Organic	I	Yes	***	5	C	2.44Y	7.47	10.36
707	Rich Gold (Imit) (Mixture)	Titanium Dioxide Coated Mica / Red Iron Oxide / Diarylide Yellow HR70 / Quinacridone	Titanium Dioxide Coated Mica / Synthetic Red Iron Oxide / Diarylide Yellow / Quinacridone	PW6 / PR101 / PY83 / PO49	77891 / 77491 / 21108 /	Synthetic Inorganic / Synthetic Organic	I	Yes	***	6	C	0.50Y	6.70	9.38
704	Bronze (Imit) (Mixture)	Coated Mica / Red Iron Oxide	Titanium Dioxide Coated Mica / Synthetic Red Iron Oxide	PR101	77491	Synthetic Inorganic	I	Yes	***	7	C	7.36YR	6.92	6.06
230	Copper (Imit) (Mixture)	Coated Mica / Red Iron Oxide	Titanium Dioxide Coated Mica / Synthetic Red Iron Oxide	PR101 / PO49	77491 / 73900 / 73920	Synthetic Inorganic / Synthetic Organic	I	Yes	***	7	A	2.28YR	5.82	8.40
716	Metallic Black (Imit) (Mixture)	Carbon Black Coated Mica	Titanium Dioxide Coated Mica / Nearly Pure Amorphous Carbon	PW6 / PBk7	77891 / 77492	Synthetic Inorganic / Natural Inorganic	I	Yes	****	10	B	2.25PB	2.86	0.40

CRYLA

Cryla | The Handbook

35