

Oxo Chemicals

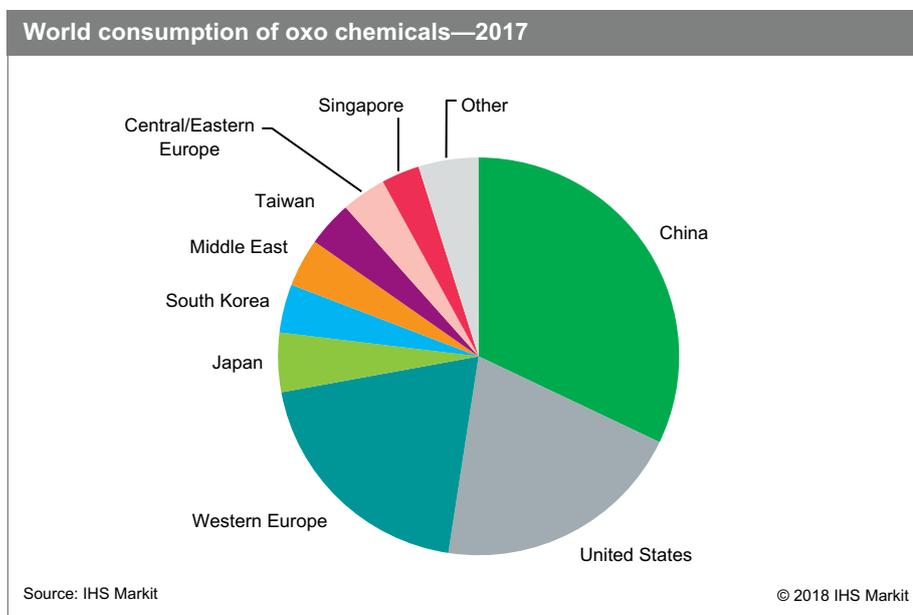
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Abstract

The oxo process or hydroformylation of olefins with synthesis gas is the principal route to C_3 - C_{15} aldehydes, which are converted to alcohols, acids, or other derivatives. By far the most important oxo chemical is n-butyraldehyde, followed by C_6 - C_{13} aldehydes for plasticizer alcohols, isobutyraldehyde, valeraldehyde, and C_{12} - C_{18} aldehydes for detergent alcohols.

Propylene-derived n-butyraldehyde and isobutyraldehyde accounted for approximately 75% of the world consumption of oxo chemicals in 2017. High consumption volumes for both of the alcohol derivatives of n-butyraldehyde—n-butanol and 2-ethylhexanol (2-EH)—will continue in the near future, largely owing to increased consumption of both alcohols in acrylate esters, acetate esters, and plasticizers. 2-EH and n-butanol continue to account for the majority of plasticizer alcohols consumption, combining for three-quarters of the global total.

The following pie chart shows world consumption of oxo chemicals:



Asia (including Japan), Europe, and North America are the largest markets for oxo chemicals, together accounting for 94% of world demand in 2017. Oxo chemicals demand in China is expected to grow well, albeit at a slower growth rate than in previous years. Demand for oxo chemicals in the United States is expected to grow modestly during 2017–22. Western European consumption of oxo chemicals is forecast to grow slowly. Japanese consumption growth is forecast to be fairly flat during 2017–22. Other Asian consumption, excluding China and Japan, is expected to grow well during the same period; Malaysia and Taiwan are the main growth markets in this region.

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By far, most oxo aldehydes are hydrogenated to alcohols. The large majority of the world consumption of n-butyraldehyde is converted to 2-EH and n-butanol, while all of the detergent and C₇-C₁₃ plasticizer oxo aldehydes are converted to their corresponding alcohols. Other oxo chemicals, including propionaldehyde, valeraldehyde, and isobutyraldehyde, have more varied applications. As a result, demand for oxo chemicals is strongly dependent on demand for C₄-C₁₃ plasticizer alcohols. Consumption of plasticizer alcohols, especially C₇-C₁₃ alcohols, depends greatly on demand for plasticizers and flexible PVC. Growth in the world consumption of plasticizer alcohols for plasticizers is forecast at 2–3% annually during 2017–22. Solvent/coating applications are the largest end use for C₄-C₅ alcohols; this includes direct solvent use and derivative solvent use, mainly as acetates, glycol ethers, and acrylates. Although nonplasticizer applications are growing at faster rates, they represent a smaller portion of the consumption of most C₆-C₁₃ alcohols.

World demand for 2-EH is still dependent on di(2-ethylhexyl) phthalate (DEHP) production and will continue to grow as a result of demand for nonphthalate dioctyl terephthalate (DOTP) plasticizer production. Global growth in DOTP as a substitute plasticizer for DEHP will continue to support 2-EH growth worldwide since this is the main raw material plasticizer alcohol used for DOTP production. In some regions, including the United States, Asia, and Western Europe, 2-EH consumption is also dependent on the production of 2-ethylhexyl acrylate.

Other plasticizer alcohols such as isononyl alcohol (INA) and 2-propylheptanol (2-PH) will also continue to grow as plasticizers derived from these alcohols (such as hydrogenated phthalates, DINP, and DPHP) will compete and substitute with traditional plasticizers. 2-PH is derived from valeraldehyde.

Oxo chemicals are not at risk of substitution by competing products; most consumption shifts in the major derivative, plasticizer alcohols, occur among different plasticizer alcohol types derived via the oxo process.

Plasticizers are the largest market for plasticizer alcohols in most regions; however, world growth prospects for plasticizers are modest or limited in many developed markets. Despite plasticizer regulations and shifts in the types of plasticizers made and used, plasticizer alcohols such as 2-EH, INA, and 2-PH will continue to be used as raw materials and grow even more.

Overall, world consumption of oxo chemicals will grow at an average annual rate of just over 3%.

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