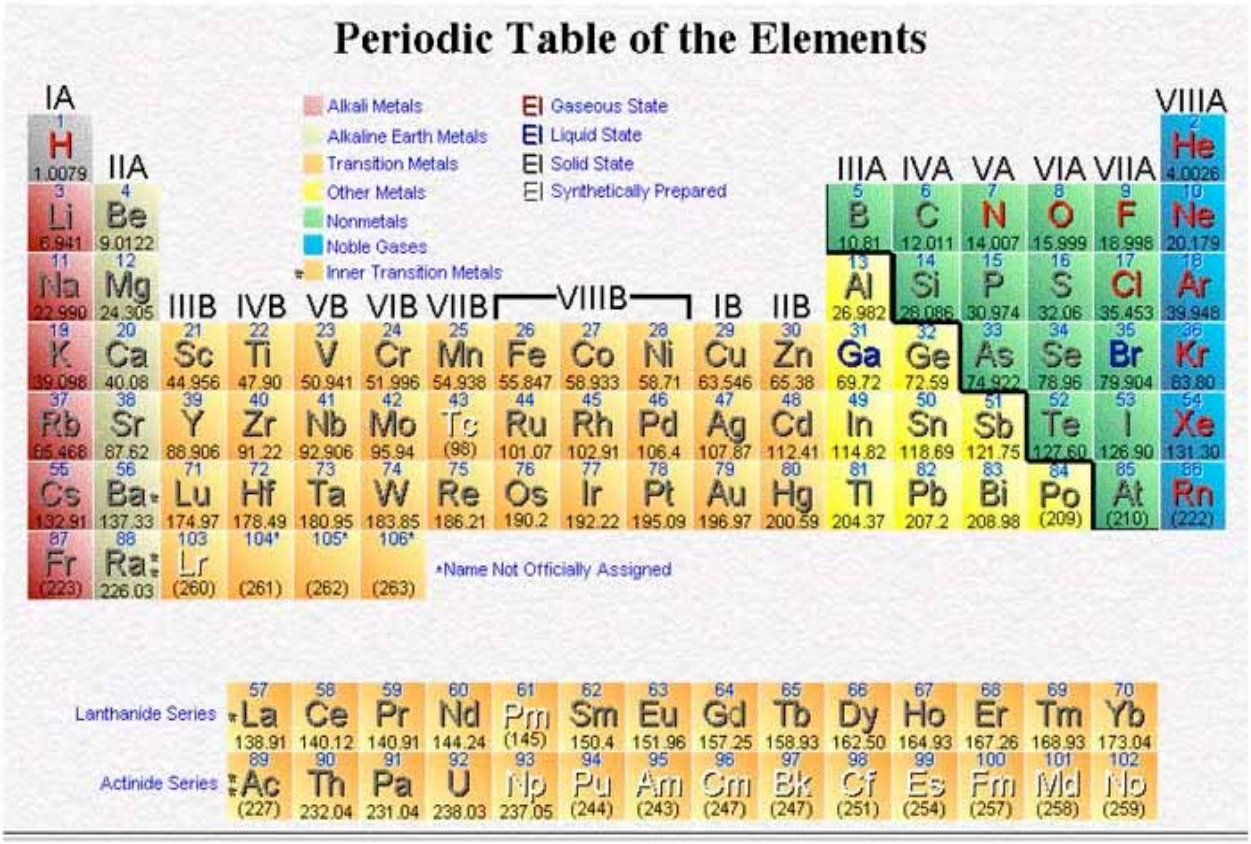
INTERNATIONAL COUNCIL OF CHEMICAL ASSOCIATIONS



WHAT IS CHEMISTRY?

The global chemical industry will be widely valued and supported for its economic, social and environmental contributions to society

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WHAT IS CHEMISTRY?

Chemistry – it's in everything and everywhere. By its very nature, the world and everything around us – air, water, the ground beneath us, the infinite number of things and technologies we use every day, as well as our own living tissue - is chemistry in motion. As society learned to harness the chemistry of nature and things, a wide range of innovative products and services - that make people's lives better, healthier and safer - has emerged. Good chemistry makes it possible. What is "it"? "It" is extended and healthier life spans, saved lives, improved quality of life, higher standards of living, an improved environment, economic benefits, and myriad social and other benefits of chemistry.

Chemistry is essential to our everyday lives. It makes possible many innovations and benefits for society. When the science of chemistry is applied, it helps make the lives of people throughout the world safer, healthier and more productive. Indeed, our food, safe water supply, clothing, shelter, health care, computer technology, transportation and every other facet of modern life, all depend upon the business of chemistry.

The business of chemistry transforms the natural raw materials of the earth, sea and air into products that we use everyday. It creates products that bring major societal benefits to quality of life, health, productivity, convenience and safety. Think of the following as the value chain of the business of chemistry:

Chemistry
↓
Discovery and Innovation
↓
Better Products
↓
Social and Economic Benefits from Better Products
↓
Improved Quality of Life, Safety and Well-Being
↓
Peace of Mind, Security, and Enjoyment of Life

Thus, the business of chemistry involves problem solving companies providing solutions to improve the world. It is a science and technology, knowledge-based industry that is key to a sustainable world economy and improved health and nutrition.

Chemical Chains

The figures that follow provide a simplified overview of some key parts of the production chain of the business of chemistry, from raw material inputs to valued outputs. There are two kinds of chemistry, organic and inorganic. Organic inputs, like oil and natural gas, contain hydrocarbons, which form the backbone of final organic chemical outputs. Very few chemicals use oil and natural gas directly as raw materials. Rather, they are first processed into natural gas liquids such as ethane, propane or into heavier liquids such as naphtha and gas oil.

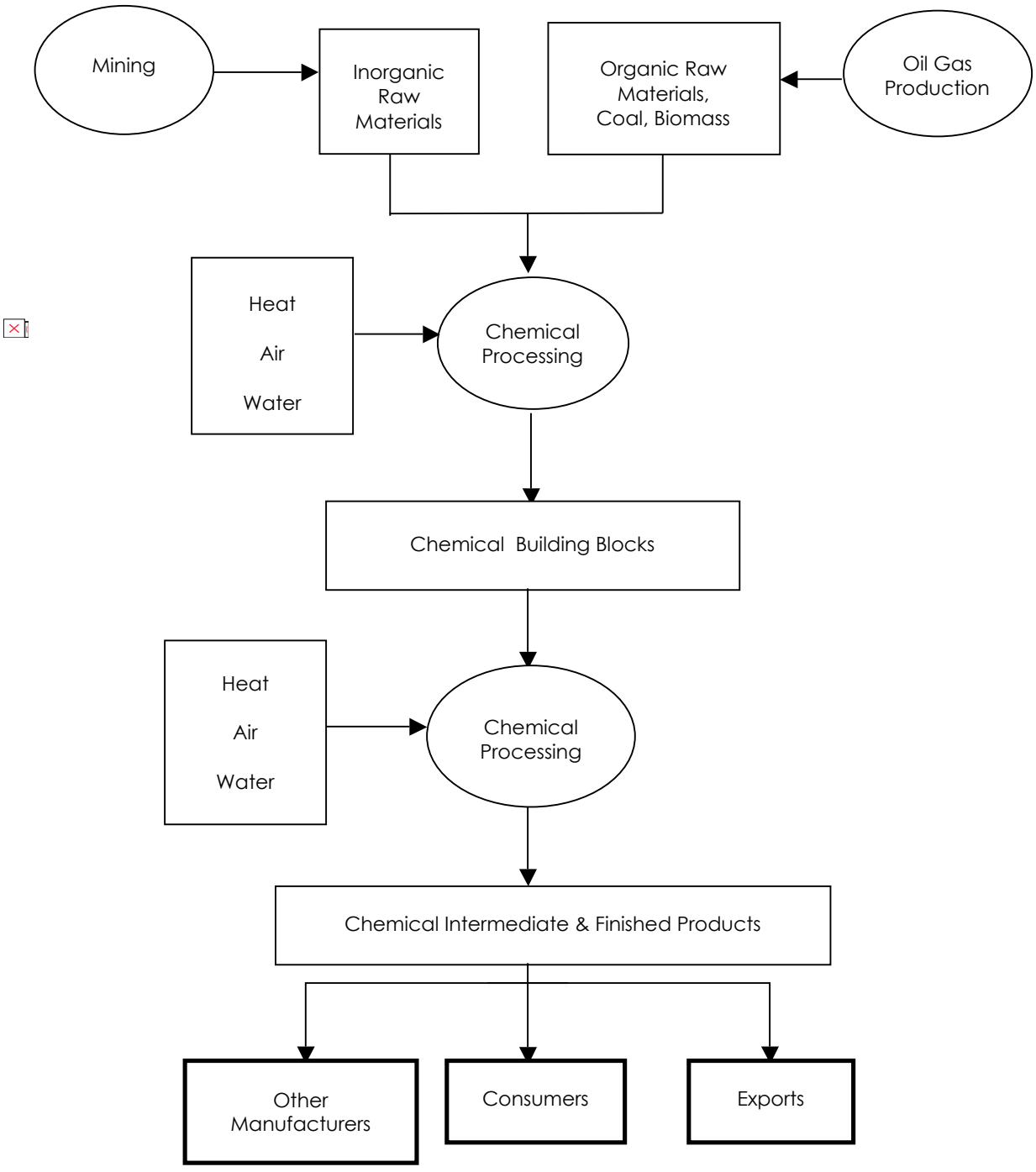
In the first stage of processing, these raw materials are refined to produce primary outputs like benzene and ethylene. Primary outputs like these are the building blocks of the business of chemistry. In subsequent stages of processing, (Figures 2.3 - 2.10) chemicals such as chlorine are added to the hydrocarbon backbones to give the compounds certain desired characteristics.

The final output may, for example, be nylon or polyester fiber, plastic, a pharmaceutical product, or other products, which are often not thought of as business of chemistry outputs.

Inorganic inputs are often compounds of two or more natural elements. Salt, a simple compound formed from sodium (Na) and chlorine (Cl) can be broken down by electrolysis to produce chlorine and caustic soda (sodium hydroxide). Chlorine (Figure 2.4), a common inorganic chemical, is used both by industries and consumers. The paper industry, for example, uses chlorine to bleach paper pulp, and consumers may appreciate it as a means of keeping their clothes white and their drinking water safe. Caustic soda is another inorganic chemical used extensively in manufacturing processes and in the production of soaps and detergents.

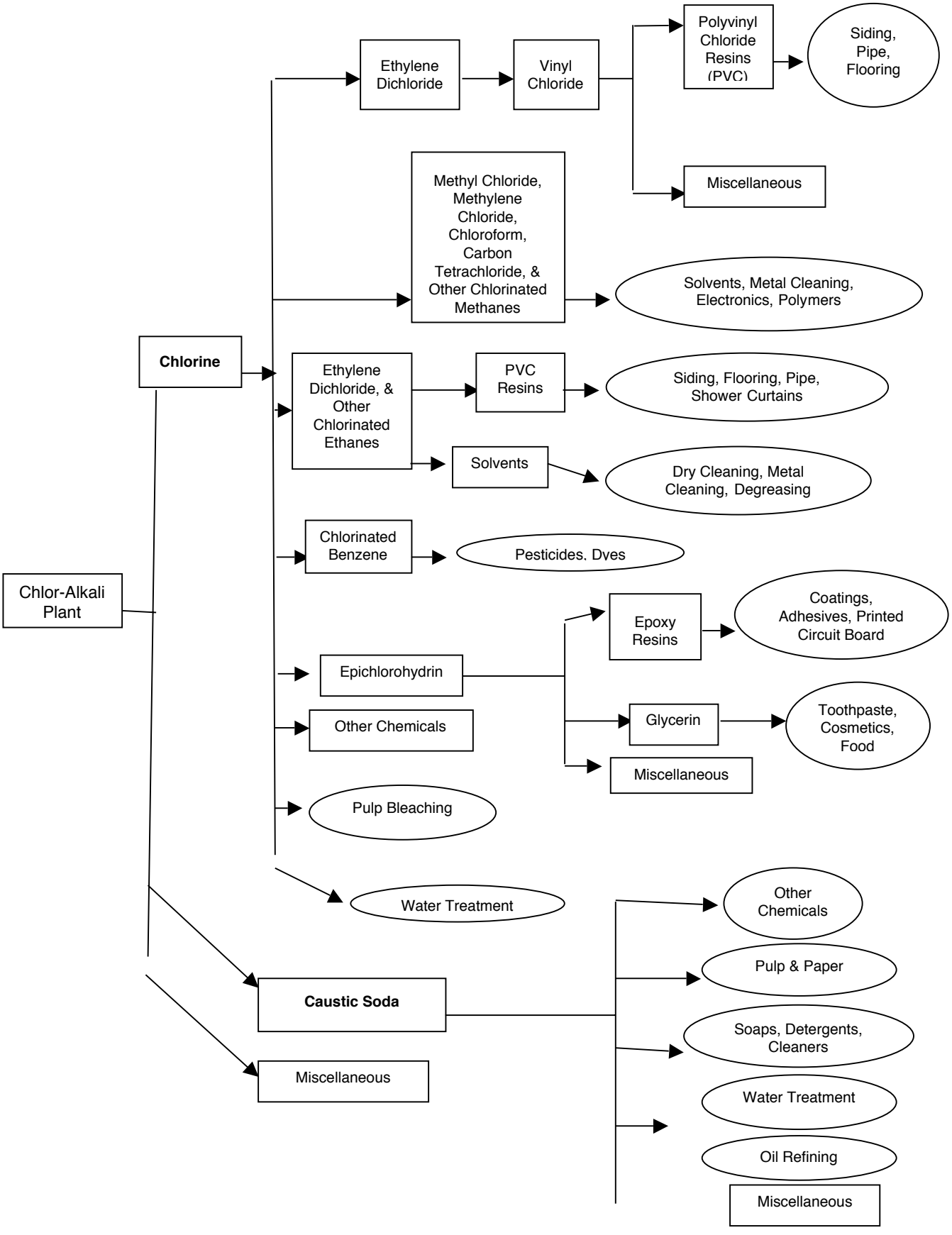
The figures that follow do not attempt to report all chemical products and processes. The vast spectrum of chemical products makes it impractical to describe more than a few simple process chains.

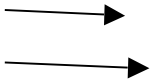
What is Chemistry?



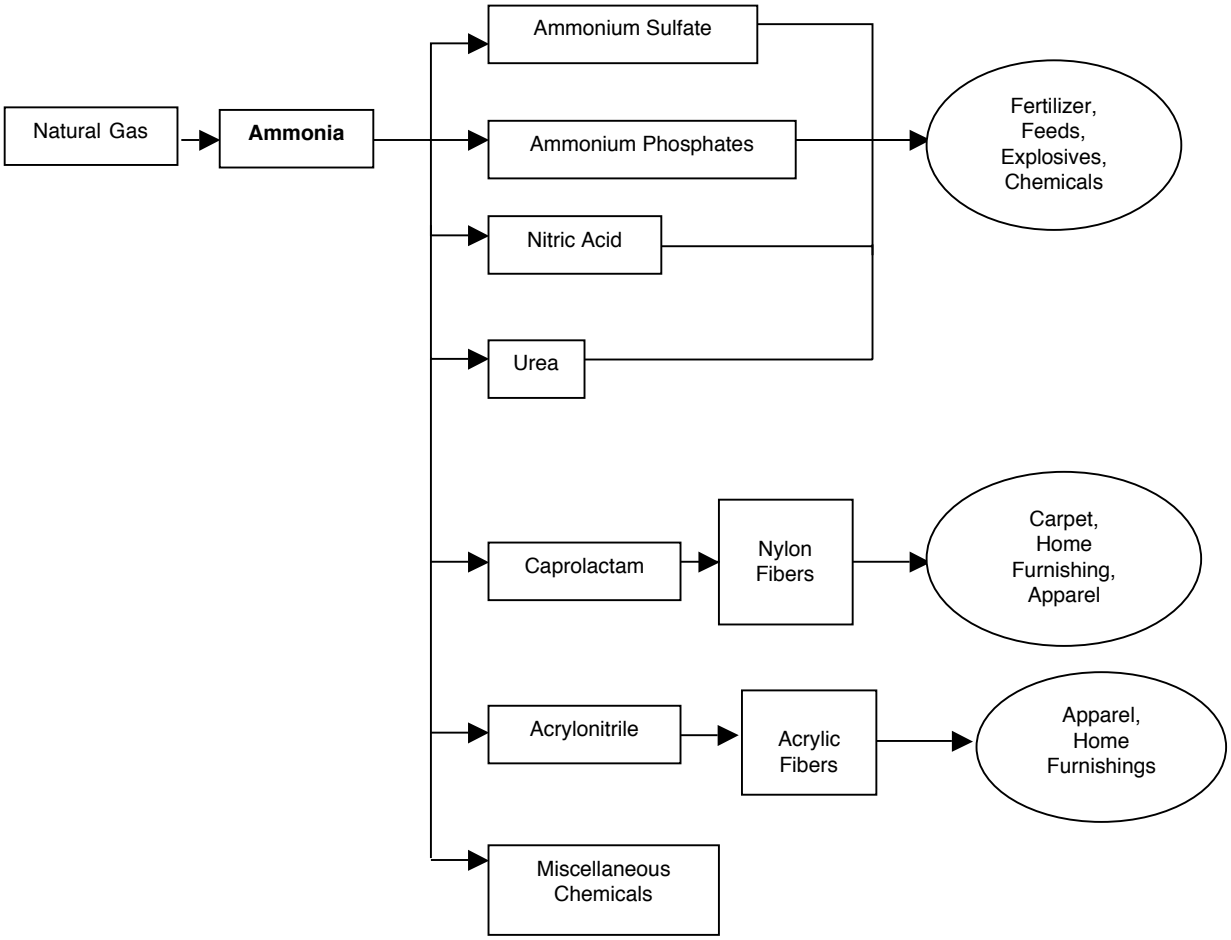
Chemistry combines organic and inorganic materials from the earth, with heat, air, and water to make products useful in modern civilization. Organic chemicals begin with raw materials containing hydrocarbons such as oil, natural gas, and coal. Inorganic chemicals do not contain carbon but are made from ores taken from the earth, such as salt.

Chlor-Alkali Chain

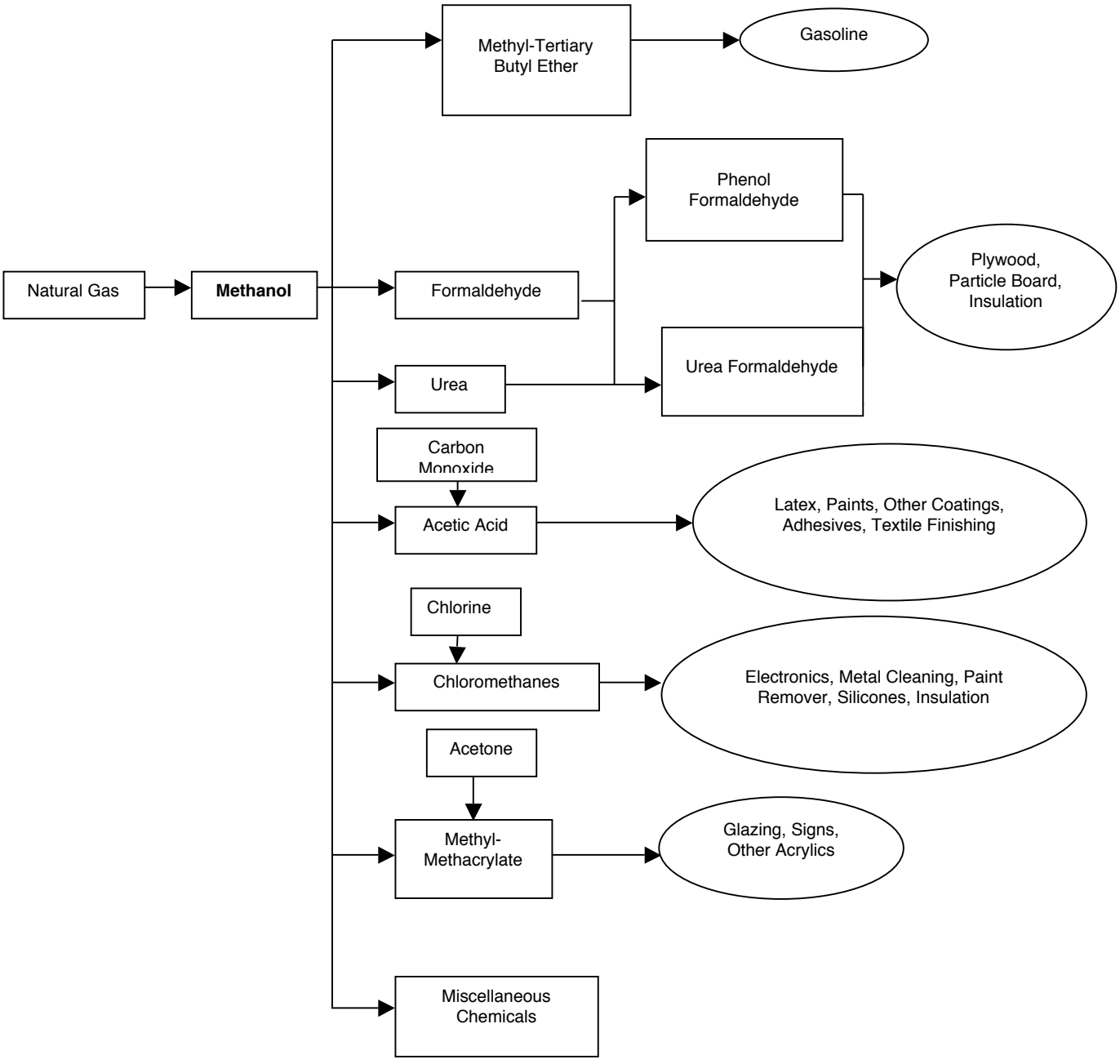




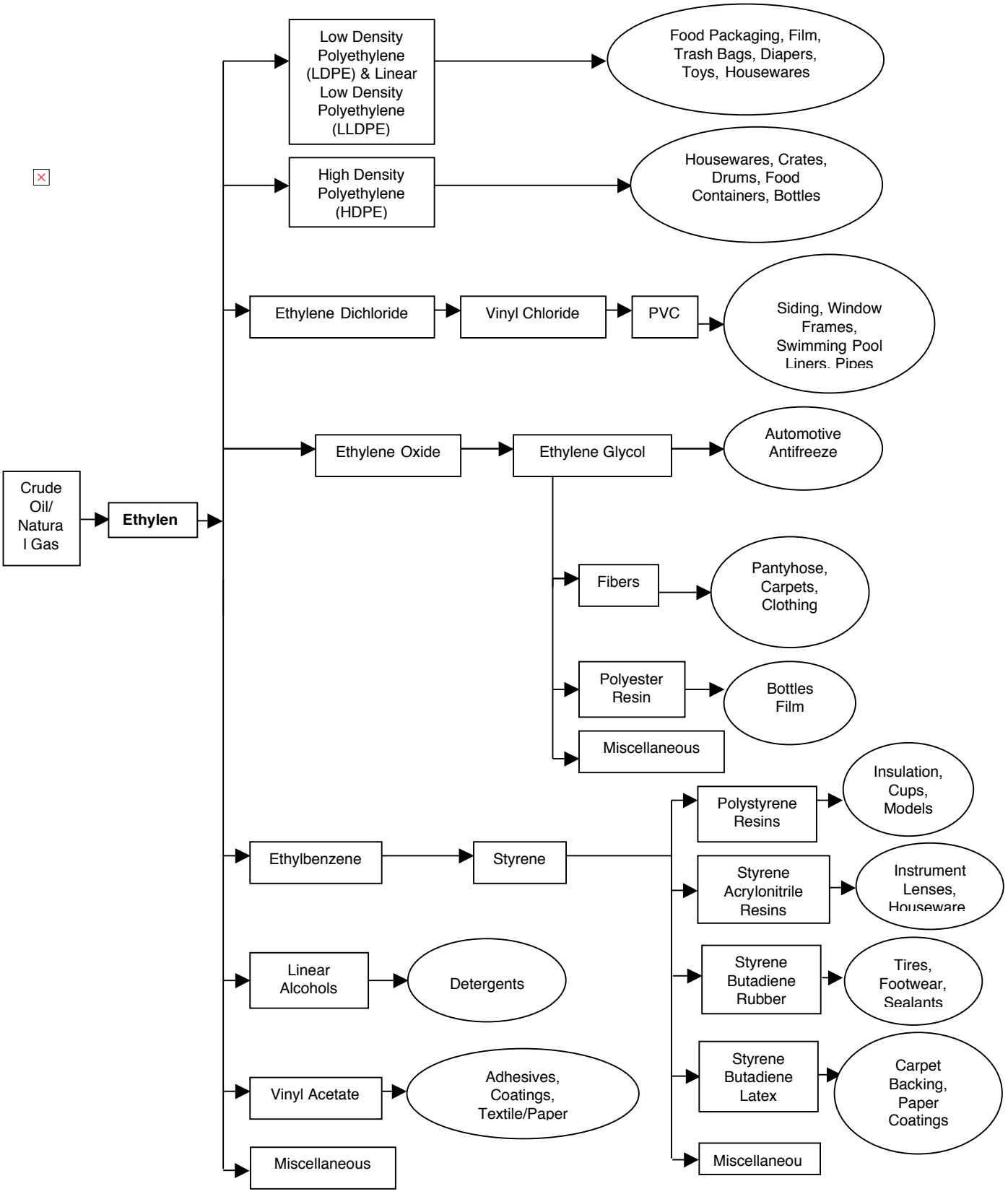
Ammonia Chain



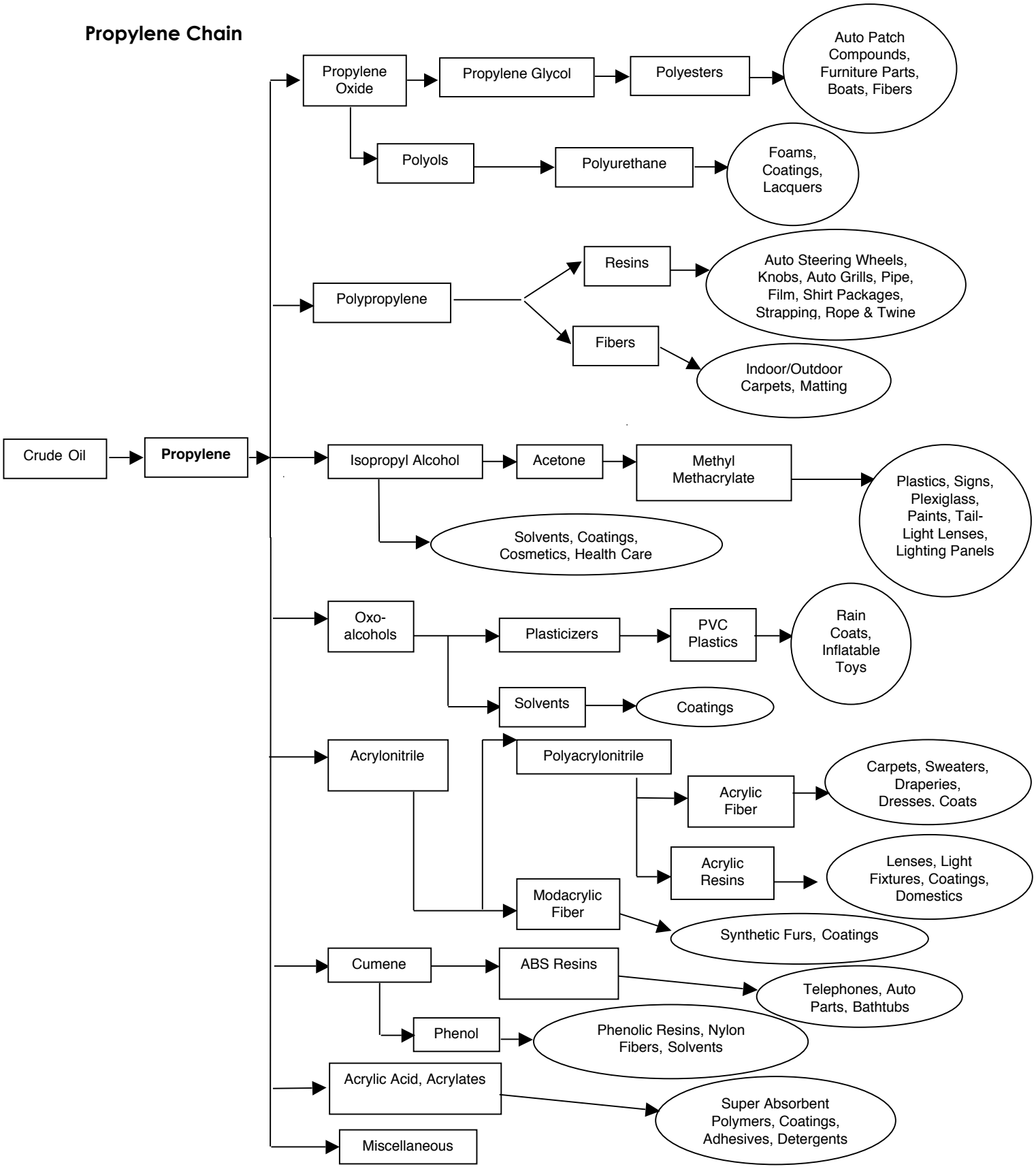
Methanol Chain



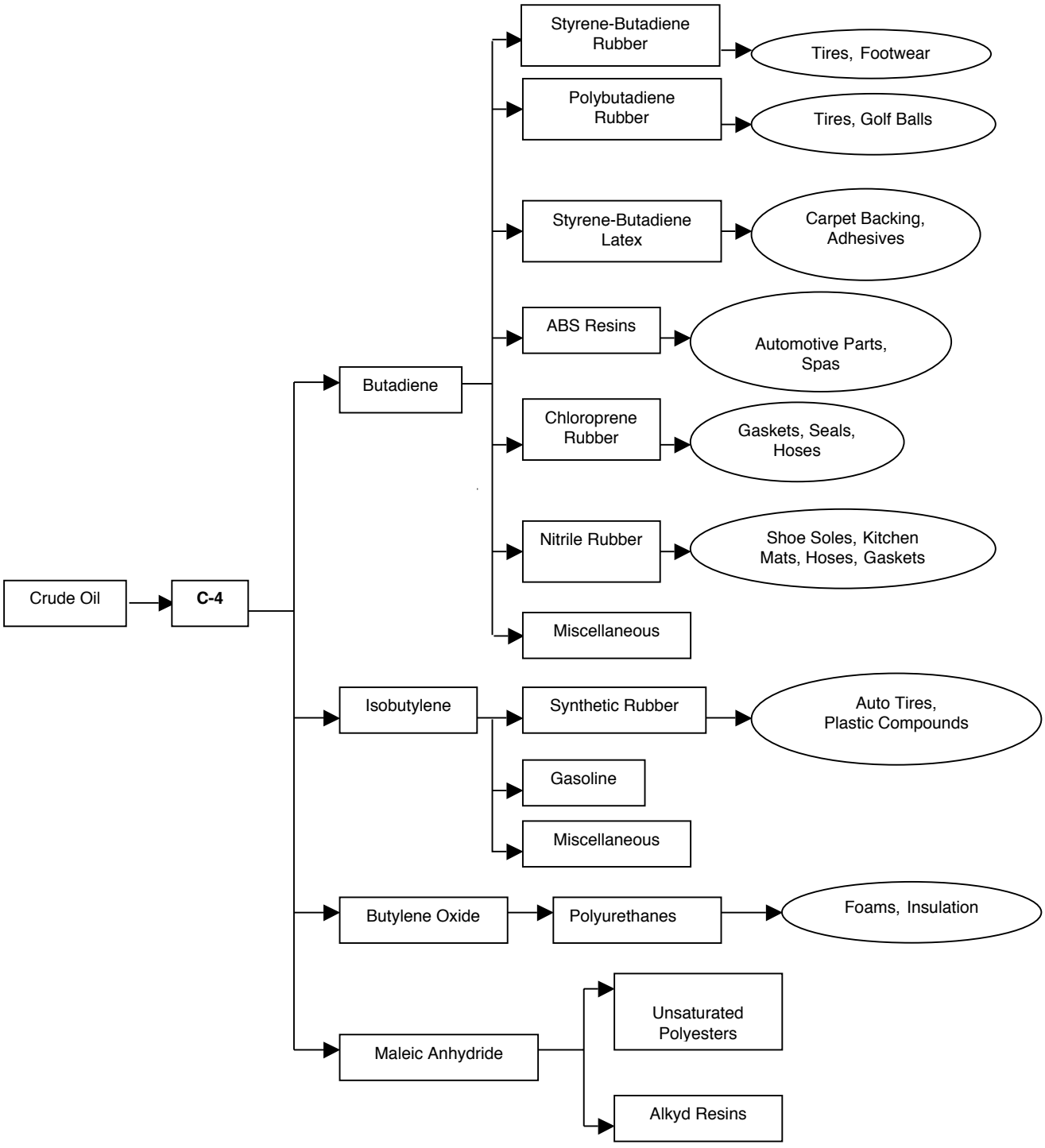
Ethylene Chain



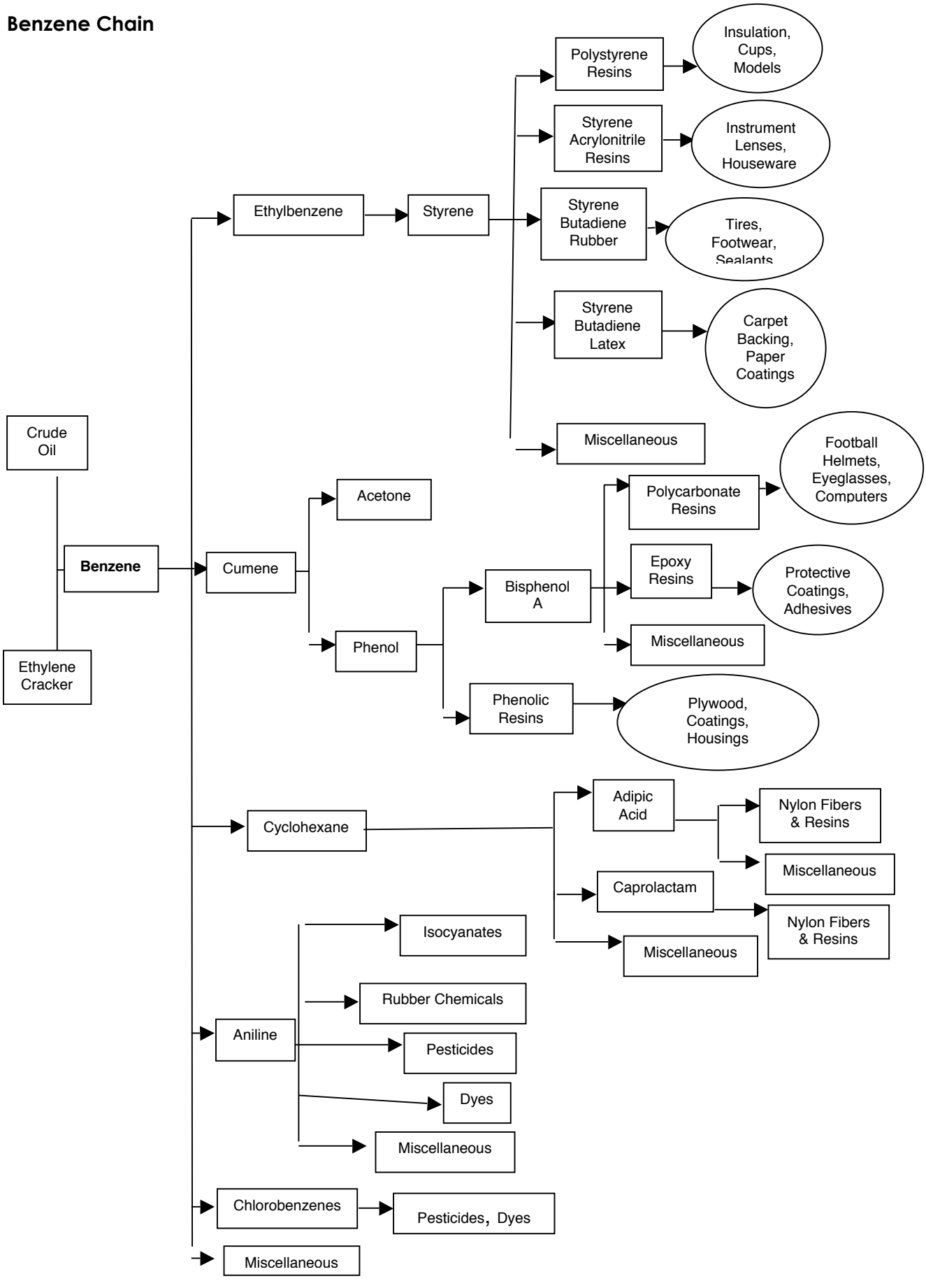
Propylene Chain



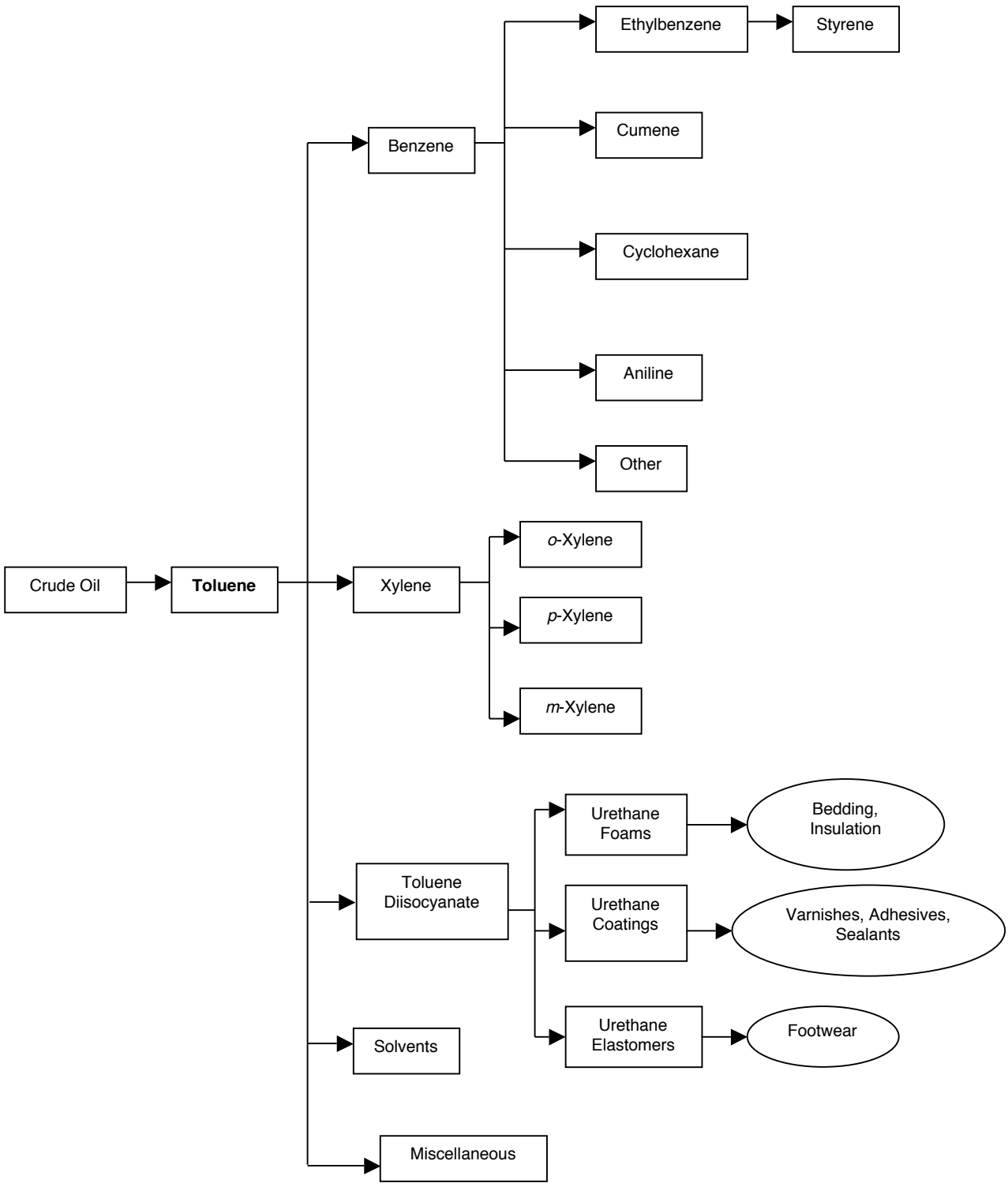
C-4 Chain


Crude Oil
C-4
Butadiene
Styrene-Butadiene Rubber
Tires, Footwear
Polybutadiene Rubber
Tires, Golf Balls
Styrene-Butadiene Latex
Carpet Backing, Adhesives
ABS Resins
Automotive Parts, Spas
Chloroprene Rubber
Gaskets, Seals, Hoses
Nitrile Rubber
Shoe Soles, Kitchen Mats, Hoses, Gaskets
Miscellaneous
Isobutylene
Synthetic Rubber
Auto Tires, Plastic Compounds
Gasoline
Miscellaneous
Butylene Oxide
Polyurethanes
Foams, Insulation
Maleic Anhydride
Unsaturated Polyesters
Alkyd Resins

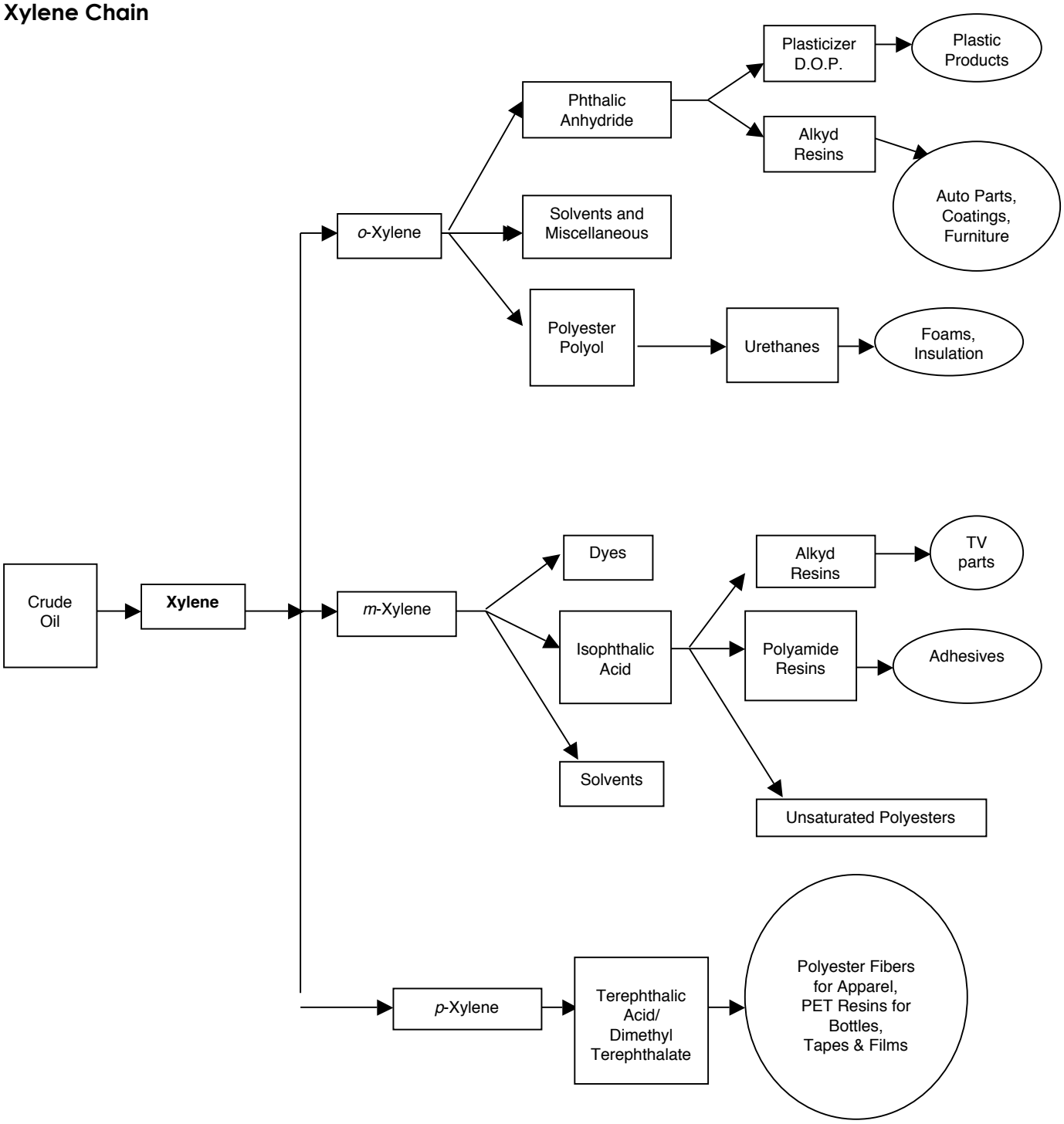
Benzene Chain



Toluene Chain



Xylene Chain



The International Council of Chemical Associations (ICCA) is the world-wide voice of the chemical industry, representing chemical manufacturers and producers all over the world. It accounts for more than 75 per cent of chemical manufacturing operations with a production exceeding USD 1.6 trillion annually. Almost 30 percent of this production is traded internationally. ICCA promotes and co-ordinates Responsible Care and other voluntary chemical industry initiatives.

ICCA has a central role in the exchange of information within the international industry, and in the development of position statements on matters of policy. It is also the main channel of communication between the industry and various international organizations that are concerned with health, environment and trade-related issues, including the United Nations Environment Programme (UNEP), the World Trade Organization (WTO) and the Organisation for Economic Co-operation & Development (OECD).