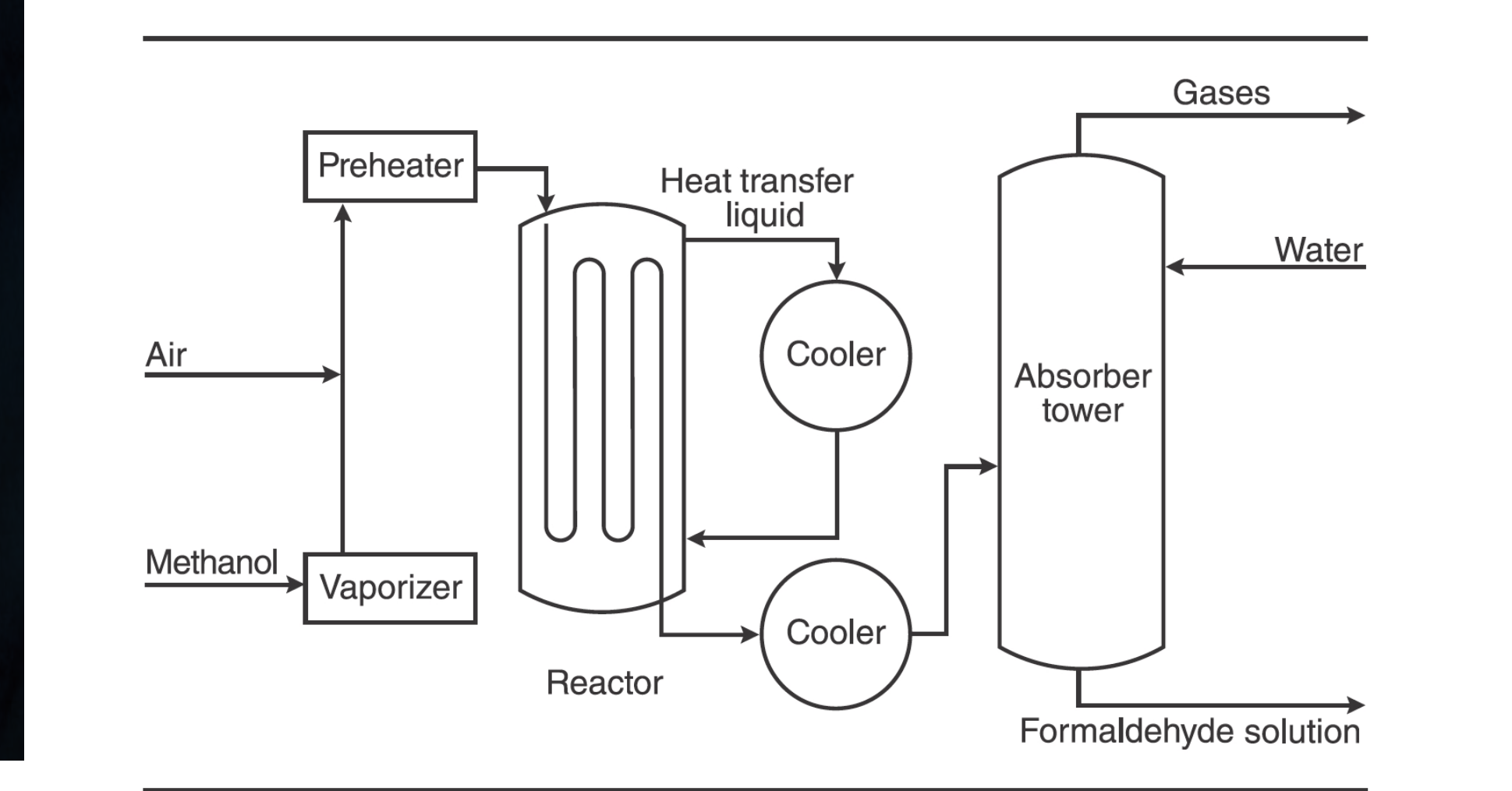
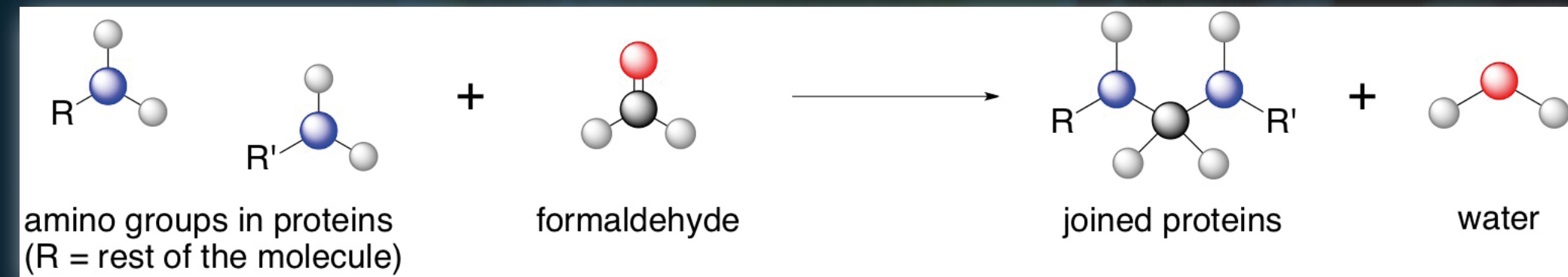


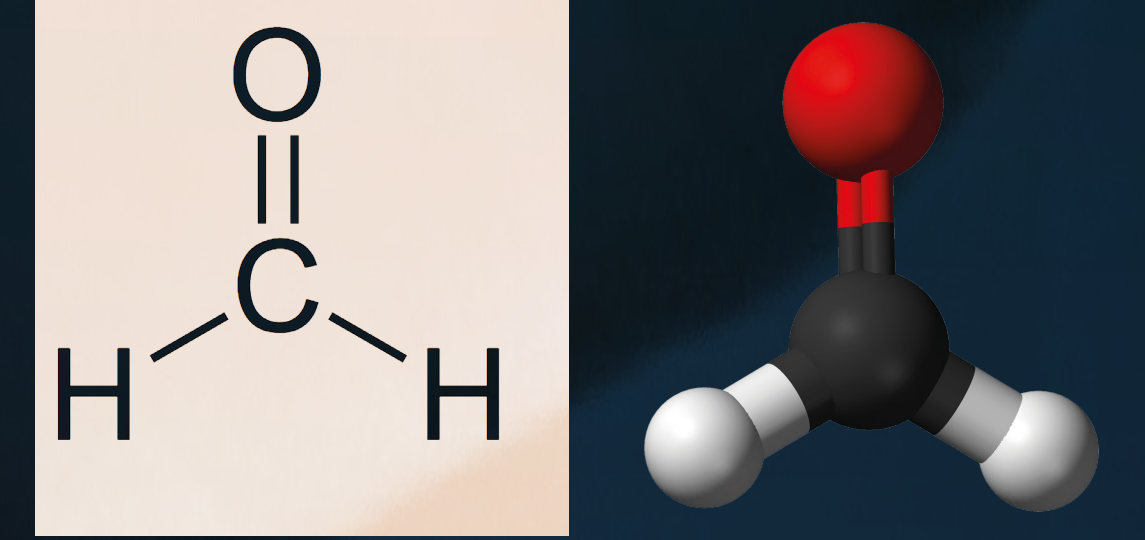


A five-year-old waits outside of her formaldehyde-laden home, Indiana 2011.



Formaldehyde process — air oxidation of methanol. *Petrochemicals in Nontechnical Language*, D. L. Burdick and W. L. Leffler, 2010

Formaldehyde



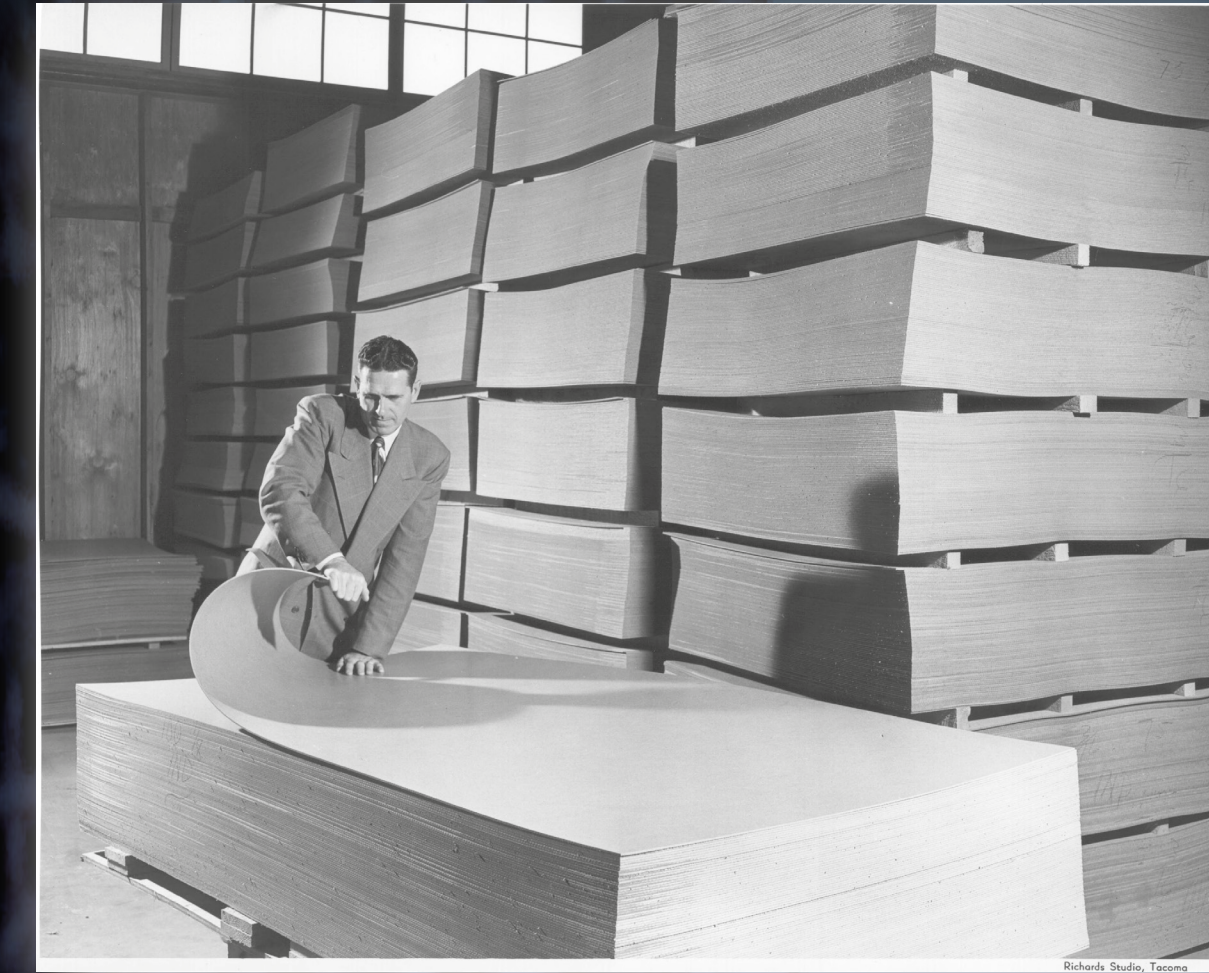
When Shelter Becomes Exposure

Indoor air is routinely more polluted than the air of corresponding outdoor environments. This is partly because polluted outdoor air seeps inside, but the major contributors to poor indoor air quality are often the construction materials of the built environment itself, which slowly off-gas a host of volatile organic compounds.

Domestic chemical ecologies have both many toxicant sources and many toxicant sinks. We are focusing on formaldehyde because it is the most common and also most toxicologically understood indoor air pollutant. Formaldehyde slowly and silently off-gasses from engineered woods, carpets, and permanent press clothing.

Formaldehyde is an irritant, an allergen, a neurotoxin and a known human carcinogen. Its presence in mammalian bodies can destroy enzymes that maintain bronchial tone, strip axons of their sheathing, dysregulate gene expression, break chromosomes, mis-fold proteins and create deficits in behavior, cognition, and learning. Neurochemists are increasingly suspecting this nearly omnipresent chemical to have a role in neurodegenerative diseases such as Alzheimer's disease and multiple-sclerosis.

Binding Functions



A man in a suit demonstrates the flexibility of a plywood veneer in the 1950s.

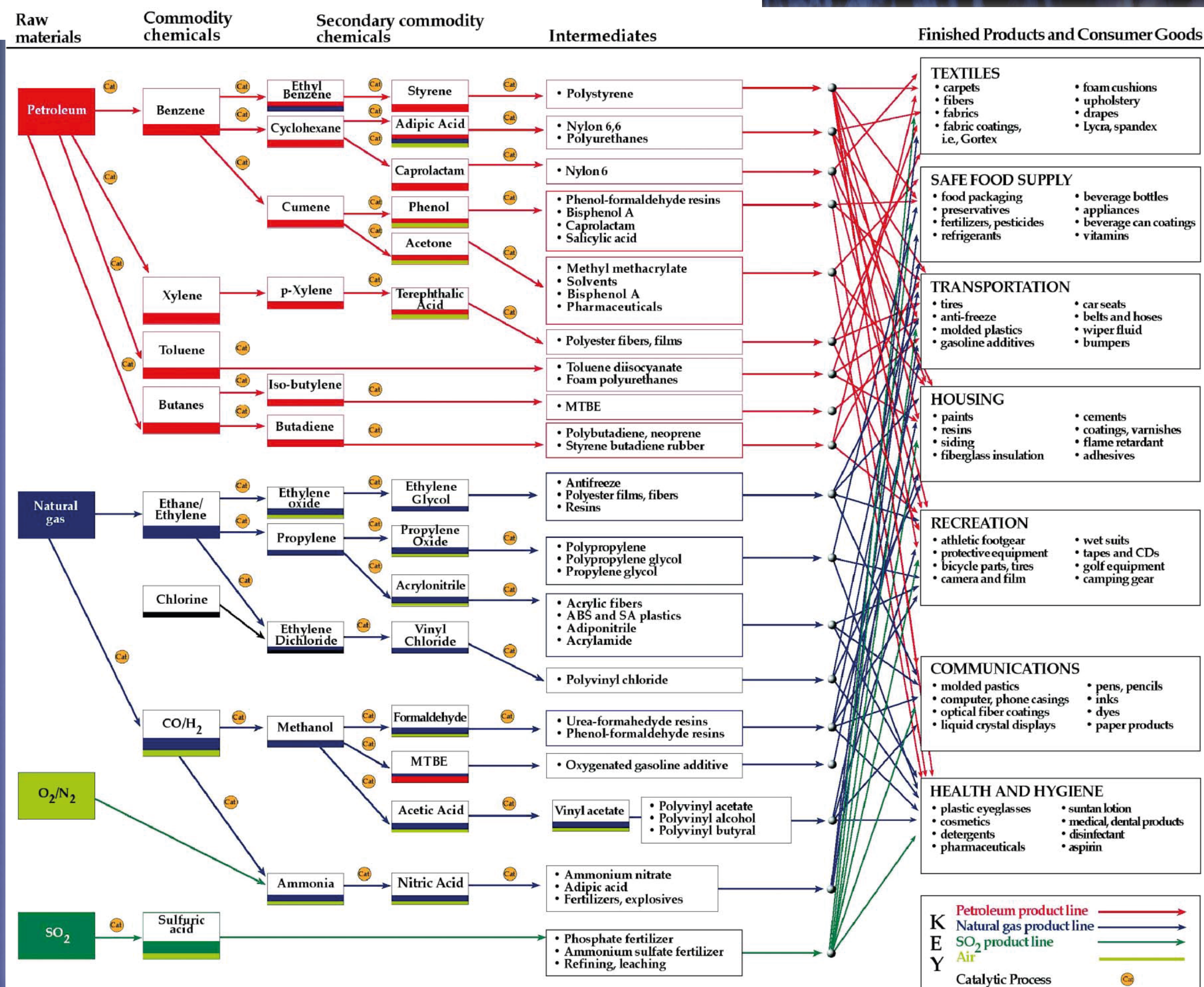
Even the most serene home is bustling with molecular labour. Before we begin to fill our homes with the airborne residues of myriad commodities, the adhesives that hold together the plywood walls, particleboard subfloors, hardboard cabinetry and carpet backings of conventional western homes slowly exhale chemical vapors into interior breathing space. In the home, no compound does as much immobilizing, adhering, hardening, painting, lacquering, disinfecting, laminating or reinforcing as formaldehyde.

Formaldehyde is not only essential to the building techniques propagated by industrial capitalism but also to life itself. In the human body, the chemical is an indispensable metabolic intermediary in the biosynthesis of two of the four building blocks of DNA, some amino acids, and molecules that plays a role in blood pressure control and hormone signaling. The chemical is both **essential** and **routinely** destructive to biotic functioning.

biotic functioning.

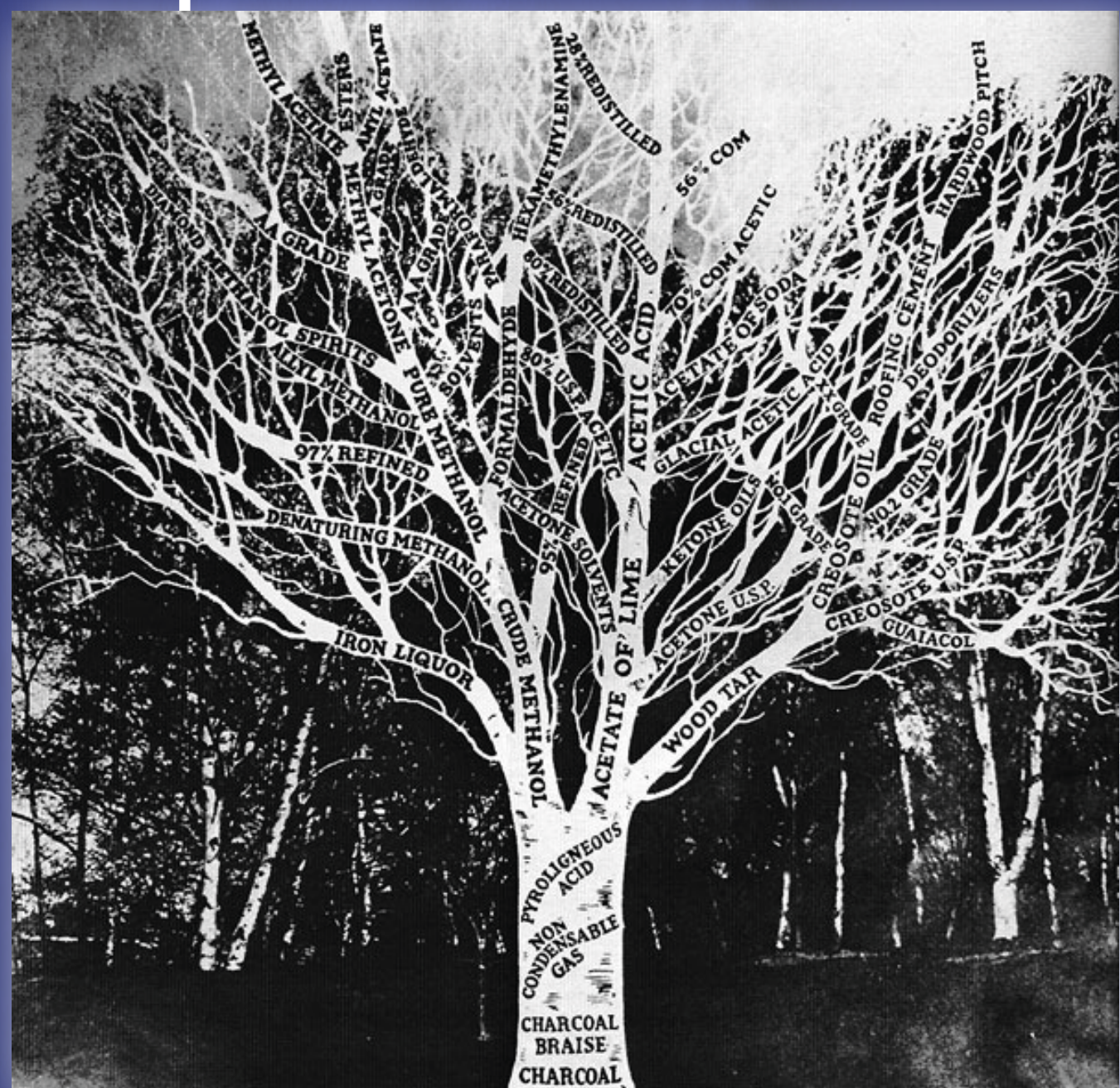
The material paradoxes of formaldehyde abound. The chemical defends home construction materials from insect, bacteria and fungal decay while also hastening the decay of human inhabitants. Ironically, this chemical not only decomposes human bodies, but an average of 3.5 gallons of formaldehyde is injected into the veins of the dead to fend off post-mortem decomposition. The compound chemically tugs Americans towards death, and then ultimately defends their inanimate bodies from biological disintegration. The removal of biotic life to maintain an immaculate form.

Flow-Chart for Products from Petroleum-based Feedstocks, 2004. National Renewable Energy Laboratory, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. (Natural gas → CO/H₂ → methanol → formaldehyde)



Extractive Histories

Formaldehyde was originally produced as a by-product of the destructive distillation of hardwoods, as were most chemical feedstocks at the turn of the 20th century. As the petroleum industry burgeoned into the petrochemical industry in the 1920s and 30s, formaldehyde became exclusively sourced from cracked methane. Formaldehyde's cheapness, and thus its ubiquity of use as a binding agent, is predicated on the economies and infrastructures of oil extraction and is implicated not only in stories of toxicant exposure, but they in downstream products or along the fence line of extraction, but also in contributions to climate change as methane is a hyper-potent greenhouse gas.



Chemical Freshness

"I love the new car smell—why, everybody does that has air fresheners, they smell like that ya know. And that's what it smelled like to me. And I was like, 'YAY!! They brought us a brand spanking new one!! I thought they would bring us an old ratty one, ya know?'" recalled a Mississippi woman who was given a rapidly built emergency home after she was displaced by Hurricane Katrina in 2005. The trailer's appearance of newness, and therefore its quality, was first observed visually but authenticated by its scent.

For many inhabitants of these homes, which were later found to harbour elevated formaldehyde levels, the social currency of the smell overrode the raw nature of its sensory experience. The chemical brew known as 'the new car smell' imbues formaldehyde exposures with pleasure, fashioning the aroma as a selling point. Borne out of the mid 20th century auto industry, the positivity of the 'new smell' is now drawn upon by consumers when purchasing a broad range of products and serves to occlude perception of potentially hazardous chemical exposures.



Various Uses of Formaldehyde

- Adhesive/Binding agent
- Solvent
- Disinfectant
- Fixative
- Lubricant
- Printing ink
- Color film development
- Bleaching agents
- Textile-sizing agent
- Plastics
- Electronic products
- Fertilizer
- Biocide
- Antiparasitic for animals
- Pharmaceuticals
- Embalming fluid
- Food preservative

Rhizospheric Alliances

Some of the silent formaldehyde emissions emanating from construction materials waft out open windows. Others are absorbed by human bodies or the bodies of companion species. Others still are metabolized by decorative indoor plants and the microbes that inhabit their roots, known as the rhizosphere. In this project we seek to accentuate the remediation capacity of this final chemical sink by pulling air down across the plant and the rhizospheric bacteria with an inexpensive aquarium pump. Without accentuating the air diffusion across these micro-ecosystems, one would need 680 potted plants to adequately scrub the air of toxicants in a 140 sq meter home.

