

Perennial Bad Actors in Synthetic Chemistry Labs

The "Dirty Dozen"

In laboratories carrying out moderate to large-scale synthetic chemistry, it is generally recognized that certain substances tend to be responsible for more than their share of accidents. These substances are referred to as the "dirty dozen".

1. Organic peroxides	Explosion hazards, especially with ground glass joints
2. Perchlorate salts of organic, organometallic, and inorganic complexes	Explosion hazards
3. Diethyl ether	Fires (see number 10 also)
4. Lithium aluminum hydride	Fires on quenching
5. Sodium, potassium	Fires on quenching
6. Potassium metal	Fires on quenching
7. Sodium-benzophenone ketyl still pots	Fires on quenching
8. Palladium on carbon	Fires on removal from the inert atmosphere, especially if wet with organic solvent or when contacting combustible materials such as filter paper
9. Heat	Exothermic reactions causing violent spills on scale-up due to inadequate provision for heat removal
10. Ethers with alpha-hydrogen atoms	Dangerous peroxide concentration during distillation; explosion hazards, especially with ground glass joints
11. Carbon monoxide	Toxicity and role in forming nickel tetracarbonyl from steel gas lines and autoclaves
12. Organic peroxides	Sensitivity to shock, sparks, and other forms of accidental detonation; sensitivity to heat, friction, impact, and light, as well as to strong oxidizing and reducing agents