Name: _____ **Date:** _____

The Invisible Hazard: 11th Grade Advanced Lab Safety Forensics Quiz

Apply OSHA-level safety synthesis to 10 complex scenarios, moving beyond basic rules to professional risk mitigation and chemical interactions.

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1. When neutralizing a concentrated sulfuric acid spill on a stone benchtop, which protocol demonstrates the highest level of risk mitigation?

A. Rapidly pouring concentrated sodium hydroxide directly onto the spill site.
B. Encircling the spill with an inert absorbent before adding sodium bicarbonate slowly.
C. Wiping the area immediately with paper towels to prevent surface etching.
D. Diluting the acid with a high-volume water spray before using a floor drain.

2. Nitric acid may be safely stored in the same secondary containment tray as glacial acetic acid, provided both are labeled as 'Acids'.

A. True
B. False

3. A student is synthesizing an organometallic compound that is highly pyrophoric. The most critical safety infrastructure required for this procedure is a/an ___.

A. Standard vertical sash fume hood
B. Inert atmosphere glove box
C. Biological safety cabinet (Class II)
D. Recirculating ductless workstation

4. You are reviewing a Safety Data Sheet (SDS) for a new reagent. Section 10 indicates the substance is 'incompatible with halogenated hydrocarbons'. Which solvent must be avoided during the reaction?

A. Dichloromethane
B. Ethanol
C. Hexane
D. Toluene

5. During a vacuum distillation, a technician notices a small 'star crack' in the boiling flask. According to advanced glass safety standards, what is the immediate risk?

A. Thermal expansion causing a slow leak of vapors.
B. An implosion due to the pressure differential.
C. Contamination of the distillate by atmospheric nitrogen.
D. The glass melting at a lower temperature point.

6. In the event of a large alkali metal fire (e.g., Sodium), a standard pressurized water extinguisher is the most effective tool for suppression.

A. True

B. False

7. When scaling up a reaction from 1.0 gram to 100 grams, the primary safety concern regarding thermodynamics is the ___.

A. Decrease in molar concentration
B. Change in the activation energy
C. Surface area to volume ratio for heat dissipation
D. Increase in the universal gas constant

8. Which of the following is a symptom of chronic, low-level exposure to a neurotoxic solvent rather than an acute exposure incident?

A. Immediate dizziness and loss of consciousness.
B. Chemical burns on the stratum corneum.
C. Gradual decline in cognitive function and motor coordination.
D. Spontaneous combustion of the waste container.

9. A scientist is working with an isotope that emits high-energy beta particles. To provide the most effective shielding while minimizing 'Bremsstrahlung' x-ray production, the container should be made of ___.

A. Lead-lined steel
B. Thick Plexiglas or plastic
C. Depleted uranium
D. Aluminum foil wrap

10. The GHS pictogram showing a 'Gas Cylinder' indicates that the contents are both under high pressure and necessarily flammable.

A. True
B. False