

Name: _____ Date: _____

Answer Key: Reactive Reasoning: The 8th Grade Lab Logic Challenge

Synthesize safety protocols and analyze chemical compatibility in this high-level assessment of laboratory risk management.

1. While distilling an unknown solution, you notice a small crack forming in the distillation flask. According to standard safety synthesis, what is the immediate risk and correct course of action?

Answer: B) Thermal stress can lead to implosion; immediately cease heating and alert the instructor.

Damaged glassware is structurally compromised. When subjected to heat or pressure changes, it is prone to catastrophic failure (implosion or explosion), necessitating immediate cessation of the activity.

2. When preparing an aqueous solution of a strong acid, you must always add _____ to _____ to prevent the concentrated liquid from Boiling and splashing due to the exothermic reaction.

Answer: C) Acid to Water

Adding acid to water (AA: Acid to Water) allows the larger volume of water to absorb the heat generated by the solvation process, preventing the acid from splattering.

3. In a lab setting involving volatile organic compounds (VOCs), a standard dust mask provides sufficient respiratory protection against chemical vapors.

Answer: B) False

Dust masks are designed for particulate matter only. Volatile vapors require specialized chemical cartridges or, more commonly in middle school, the use of a certified fume hood.

4. You are tasked with cleaning up a spill of 1M Hydrochloric Acid. Which substance would be the most chemically appropriate for neutralizing the spill before disposal?

Answer: A) Sodium Bicarbonate (Baking Soda)

Sodium Bicarbonate is a weak base that safely neutralizes strong acids. Using a strong base (NaOH) could cause a secondary violent reaction, and water only dilutes rather than neutralizes.

5. The safety device used specifically for the 'Pass, Aim, Squeeze, Sweep' (P.A.S.S.) technique is the _____.

Answer: B) Fire Extinguisher

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P.A.S.S. is the universal acronym for the correct operation of a fire extinguisher: Pull the pin, Aim at the base, Squeeze the lever, and Sweep side to side.

6. If a classmate's clothing catches fire, the most effective tool to smother the flames quickly is the emergency eyewash station.

Answer: B) False

The fire blanket is the appropriate tool to smother flames on a person. The eyewash station is strictly for flushing hazardous substances out of the eyes.

7. Examine the scenario: A student is heating a test tube over a Bunsen burner. Which element of their technique represents a 'synthesis level' understanding of safety?

Answer: A) Pointing the mouth of the tube toward the nearest wall or empty space.

Pointing the tube away from people accounts for the risk of 'bumping' (sudden boiling), demonstrating proactive risk mitigation. Choice B is dangerous as pressure will build and shatter the glass.

8. According to the Globally Harmonized System (GHS), a pictograph showing a skull and crossbones indicates that a chemical has _____ toxicity.

Answer: B) Acute

The skull and crossbones symbol is used for acute toxicity, meaning the substance can cause immediate and severe health effects or death upon exposure.

9. Advanced labs often use 'Secondary Containment' for chemical storage. What is the primary purpose of this practice?

Answer: B) To prevent accidental mixing of incompatible chemicals in the event of a primary container leak.

Secondary containment (like tubs or trays) ensures that if a bottle breaks or leaks, the contents are captured and do not react with other chemicals stored nearby.

10. If a non-corrosive chemical makes contact with your skin, you should flush the area with water for a minimum of 15 to 20 minutes.

Answer: A) True

Standard safety protocol for any chemical exposure to skin or eyes is a prolonged flush (15-20 minutes) to ensure total removal and dilution of the residue.