

Name: _____ Date: _____

Answer Key: Middle School Lab Forensics: Prove You Can Surmount These Advanced Safety Scenarios

Students evaluate complex experimental hazards, synthesize emergency response priorities, and analyze reagent incompatibility through rigorous situational inquiry.

1. A student accidentally knocks over a graduated cylinder containing an unknown volatile organic solvent. According to standard safety protocols for hazard mitigation, which action must take priority?

Answer: B) Alerting the instructor and securing the perimeter to prevent slips

Safety protocols dictate that the instructor must lead the cleanup of unknown substances. Securing the area prevents further injury to peers while the expert assesses the spill's chemistry.

2. If a student's clothing catches fire during a Bunsen burner experiment, the most effective immediate response is to run to the safety shower to extinguish the flames.

Answer: B) False

Running fans the flames. The 'Stop, Drop, and Roll' technique or the use of a fire blanket by a partner is the prioritized immediate action to smother the fire.

3. When diluting a concentrated acid for a chemical reaction, a scientist must always add the ____ to the ____ to prevent rapid heat release and splashing.

Answer: B) Acid; Water

Adding acid to water (AA: Add Acid) allows the large volume of water to absorb the heat generated by the exothermic reaction, preventing dangerous boiling and splashing.

4. An experiment requires heating a test tube over an open flame. Which of these demonstrates a sophisticated understanding of mechanical safety and thermal energy?

Answer: D) Pointing the mouth of the test tube away from yourself and all other people

Heating can cause 'bumping' or rapid ejection of contents. Pointing the opening away from everyone is a critical preventative measure against chemical burns.

5. Secondary containers used for storing transferred chemicals only require a label if the substance is known to be highly toxic or corrosive.

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Answer: B) False

All secondary containers must be labeled with the chemical name and hazards regardless of perceived toxicity to prevent accidental misuse or dangerous mixing.

6. To safely detect the odor of a chemical released during a reaction without inhaling high concentrations of potentially toxic vapors, you should use the ____ technique.

Answer: C) Wafting

Wafting (using your hand to wave the air toward your nose) ensures that only a small, diluted amount of the vapor reaches your olfactory senses.

7. During a lab involving electrical circuits and water baths, you notice a wire has a small section of exposed copper. Evaluate the safest course of action:

Answer: C) Disconnect the device and report the damaged equipment immediately

Damaged electrical equipment is a high-risk hazard. It must be decommissioned and reported rather than 'fixed' with temporary measures like tape by a student.

8. If a corrosive alkali solution splashes into a student's eyes, the victim must flush their eyes at the eyewash station for a minimum of ____ minutes.

Answer: D) Fifteen

OSHA and ANSI standards require a minimum of 15 minutes of continuous flushing to ensure that chemicals are thoroughly diluted and removed from the ocular tissue.

9. When disposing of biological specimens or chemical waste, it is acceptable to pour them down the drain as long as they are flushed with a large volume of water.

Answer: B) False

Many chemicals and biological materials are hazardous to the environment or can react with plumbing. Waste must be disposed of in designated hazardous waste containers.

10. Which of the following represents an analytical approach to selecting Personal Protective Equipment (PPE) for a lab involving heating glass and using mild acids?

Answer: C) Wearing chemical splash goggles, a lab apron, and heat-resistant gloves

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PPE selection must address all identified hazards: splash goggles for acids, an apron for body protection, and heat-resistant gloves for handling hot glassware.