Name: _____ **Date:** _____

Answer Key: Searing Solutions and Reactive Risks: A 9th Grade Lab Safety Case

Risk assessment, chemical compatibility, and protocol synthesis; develop the high-level intuition required for complex secondary science investigations.

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1. While refluxing a flammable solvent, a student notices a small crack forming in the round-bottom flask. What is the most rigorous sequence of actions to mitigate a catastrophic failure?

Answer: B) Remove the heat source, alert the instructor, and evacuate the immediate splash zone.

Safety protocols prioritize life over materials; removing the energy source (heat) and creating distance from a potential mechanical failure/fire is the standard high-school response.

2. The GHS (Globally Harmonized System) pictogram featuring a burning circle, known as the _____, indicates that a substance can provide oxygen to a fire.

Answer: C) Oxidizer

Oxidizers (represented by a flame over a circle) are distinct from flammables because they facilitate combustion in other materials by providing oxygen.

3. When diluting a concentrated acid, it is scientifically safer to pour the acid into the water rather than water into the acid to utilize the heat capacity of the water.

Answer: A) True

The 'AA' (Add Acid) rule prevents the acid from splashing or boiling out; water has a high specific heat capacity and can absorb the energy released during the exothermic dissolution.

4. A student is analyzing a Safety Data Sheet (SDS) for an unknown reagent. Section 10 indicates 'Incompatible with Organic Solvents.' What does this imply for experimental design?

Answer: C) Mixing this reagent with ethanol or acetone could cause a dangerous reaction.

Chemical compatibility is a critical 9th-grade skill; 'incompatible' indicates that mixing those substances may result in heat, toxic gas, or explosions.

5. To ensure maximum effectiveness during a minor chemical splash in the eyes, the eyewash station must be used for a minimum of _____ minutes while holding eyelids open.

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Answer: C) 15

ANSI standards recommend a 15-minute flush to ensure the chemical is fully diluted and the pH of the eye tissue begins to neutralize.

6. In a scenario where a secondary container of clear liquid is found unlabeled, which action demonstrates the highest level of safety leadership?

Answer: C) Isolate the container and immediately notify the instructor for hazardous waste disposal.

Unlabeled containers are significant hazards; students should never attempt to identify them through physical senses or unsanctioned testing.

7. If a student's clothing catches fire, the primary recommendation is to run to the emergency shower if it is more than 10 feet away.

Answer: B) False

Running fans the flames. The 'Stop, Drop, and Roll' technique or using a fire blanket is safer and faster if the shower is not immediately reachable.

8. When working with a centrifuge, the most critical step to prevent mechanical failure and potential injury is to ensure the load is _____.

Answer: B) Balanced

A centrifuge spinning at high RPMs will vibrate violently and potentially explode or shatter if the test tubes are not placed in a balanced, symmetrical configuration.

9. You are heating a test tube over a Bunsen burner. Which technique demonstrates proper analytical safety?

Answer: A) Pointing the mouth of the tube toward the back of the fume hood or a wall.

Pointing the tube away from people prevents injury from 'bumping' (sudden boiling), and never sealing a heated system prevents pressure-induced explosions.

10. Contact lenses are generally discouraged in the lab because they can trap chemical vapors against the cornea, even when wearing impact-resistant goggles.

Answer: A) True

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While many labs allow them now with proper goggles, the standard safety concern is that capillary action can draw liquids or vapors behind the lens, making irrigation difficult.