PROBLEM 6: GRIND IT

Section A – Multiple Choice Questions (*Circle the correct answer)*

1. Which of the following substances is commonly used as an indicator in acid-base titrations due to its color change?

    a. Bromothymol blue
    b. Sodium chloride
    c. Calcium carbonate
    d. Water

2. Which of the following processes is used to separate mixtures based on their boiling points?

    a. Chromatography
    b. Recrystallization
    c. Distillation
    d. Filtration

3. Which of the following substances is commonly used as a reducing agent in chemical reactions?

    a. Oxygen
    b. Hydrogen
    c. Carbon dioxide
    d. Sodium borohydride

4. Which of the following substances is commonly used in photography due to its ability to undergo a redox reaction with light?

    a. Silver chloride
    b. Sodium chloride
    c. Calcium carbonate
    d. Water

5. Which of the following substances is commonly used in fire extinguishers due to its ability to react with flames?

    a. Sodium chloride
    b. Calcium carbonate
    c. Carbon dioxide
    d. Water

6. A student observed a yellow solid turning into a red powder upon grinding. What can be concluded about the chemical identity of the substance?

    a. It is a pure compound
    b. It is a mixture of two compounds

c. It is a mixture of two elements
d. It is a pure element

7. Which of the following statements is true about the color change phenomenon in minerals?

    a. It only occurs in metallic minerals
    b. It only occurs in minerals with a specific crystal structure
    c. It is always caused by a change in the oxidation state of the metal
    d. It can be used to identify minerals in geological samples

8. A compound exhibits a color change from green to red upon grinding. Which of the following is a possible explanation for this phenomenon?

    a. The compound undergoes a change in its crystal structure
    b. The compound undergoes a change in its oxidation state
    c. The compound undergoes a change in its pH
    d. The compound undergoes a change in its solubility

9. A mixture of two compounds exhibits a color change from yellow to green upon grinding. What can be concluded about the chemical identity of the compounds?

    a. Both compounds are yellow in color
    b. Both compounds are green in color
    c. One compound is yellow and the other is green
    d. The color change is not related to the chemical identity of the compounds

10. What is the main advantage of using the color change property of substances in medical applications?

    a. It allows for the detection of diseases
    b. It allows for the treatment of diseases
    c. It allows for the identification of drugs
    d. It allows for the purification of drugs

11. Which of the following minerals is known to exhibit a color change upon exposure to UV light?

    a. Fluorite
    b. Calcite
    c. Halite
    d. Pyrite

Section B – Structured Questions (*Write answer in space provided)*

1. Explain the chemistry behind the color change in thermochromic materials. Give an example of a thermochromic material and describe a potential application for it.

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2. Give an example of a material that changes color when exposed to UV light.

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3. What is the property of a material that allows it to absorb certain colors of light and reflect others?

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4. How can the property of color change be used in

   a. medical diagnostics? Give an example of a diagnostic tool that utilizes this property and explain how it works.

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   b. food safety? Give an example of an indicator that utilizes this property and explain how it works.

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   c. the development of new materials for energy conversion and storage? Give an example of a material that utilizes this property and explain how it works.

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5. What is the property of a material that allows it to emit light when excited by an energy source?

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6. Give an example of a material that changes color when exposed to air or moisture.

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7. Explain the chemistry behind the color change in pH indicators. Give an example of a pH indicator and explain how it works.

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8. What is the property of a material that allows it to change color when ground up into smaller particles?

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9. What is the difference between fluorescence and phosphorescence? Give an example of a material that exhibits each property and explain how it works.

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10. How can the property of color change be used in the development of new materials for color printing? Give an example of a material that utilizes this property and explain how it works.

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11. Give an example of a material that changes color when exposed to heat and then returns to its original color when cooled.

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12. If a white powder turns blue upon grinding, what can be inferred about its particle size?

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13. Explain the chemistry behind the color change in thermoluminescent materials. Give an example of a material that exhibits this property and describe a potential application for it.

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14. Give an example of a common household substance that changes color when exposed to an acid or a base.

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15. What is the property of a material that allows it to change color when heated?

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16. What is the difference between a chemical change and a physical change?

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17. If a compound is known to absorb light in the visible range and reflects green light, what can be inferred about its color?

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18. If a mixture of two colorless solutions results in a yellow precipitate, what can be inferred about the chemical reaction?

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19. If a mineral sample is known to exhibit different colors when viewed from different angles, what can be inferred about its crystal structure?

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20. If a substance changes from a liquid to a solid upon cooling, what can be inferred about its molecular structure?

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21. If a compound dissolves in water to produce an acidic solution, what can be inferred about its chemical nature?

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22. If a mixture of two liquids produces a colorless solution, what can be inferred about the interaction between the two components?

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23. If a substance can be purified by recrystallization, what can be inferred about its solubility properties?

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24. If a substance undergoes a color change when exposed to an oxidizing agent, what can be inferred about its susceptibility to oxidation?

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25. If a compound reacts with a metal to produce a gas, what can be inferred about its reactivity?

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26. If a substance is known to have a high boiling point, what can be inferred about its intermolecular forces?

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