

Name _____

2nd Benchmark for Semester 1 2008–2009

Physical Science

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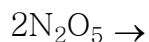
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DIRECTIONS: The items in this test are based on the North Carolina Standard Course of Study for Physical Science. Proceed with the test on the next page.

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- Which compound could be used to neutralize HNO_3 ?
 - H_2SO_4
 - NaCl
 - $\text{Al}_2(\text{SO}_4)_3$
 - KOH
- What is the total number of electrons in a Mg atom?
 - 2
 - 10
 - 12
 - 24
- What is the total number of valence electrons in an atom of phosphorus?
 - 2
 - 3
 - 5
 - 7
- Which compound contains ionic bonds?
 - N_2O
 - Na_2O
 - CO
 - CO_2
- What is the best method for a student to determine if a substance is an acid or a base?
 - taste it
 - centrifuge it
 - mix it with water
 - use litmus paper
- What has the *least* affect on the rate of dissolving a solid in water?
 - the crystal size of the solid
 - stirring the solution
 - the water temperature
 - air pressure above the solution
- Which equation *correctly* illustrates the conservation of mass?
 - $\text{H}_2 + \text{Cl}_2 \rightarrow \text{HCl}$
 - $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
 - $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
 - $\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

8. Given the incomplete equation:

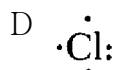
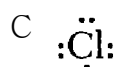
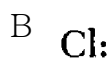
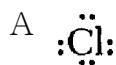


Which set of products completes and balances the incomplete equation?

- A $2\text{N}_2 + 3\text{H}_2$
- B $2\text{N}_2 + 2\text{O}_2$
- C $4\text{NO}_2 + \text{O}_2$
- D $4\text{NO} + \text{SO}_2$
9. Which products are formed when an acid reacts with a base?
- A an alcohol and carbon dioxide
- B an ester and water
- C a soap and glycerine
- D a salt and water
10. When the equation
- $$3\text{Zn} + 2\text{H}_3\text{PO}_4 \rightarrow \text{Zn}_3(\text{PO}_4)_2 + x\text{H}_2$$
- is correctly balanced, what is the coefficient represented by x ?
- A 1
- B 2
- C 3
- D 4

11. What is the name for the compound NH_4Cl ?

- A nitrogen chloride
- B nitrogen chlorate
- C ammonium chloride
- D ammonium chlorate
12. Which formula represents a substance that contains covalent bonds?
- A LiCl
- B CaCl_2
- C K_2O
- D CO_2
13. Which is the electron dot symbol for a chlorine atom?



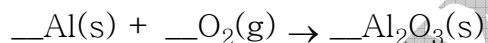
14. Which equation represents a synthesis reaction?

- A $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$
 B $\text{KOH} + \text{HNO}_3 \rightarrow \text{KNO}_3 + \text{H}_2\text{O}$
 C $\text{F}_2 + \text{CaBr}_2 \rightarrow \text{CaF}_2 + \text{Br}_2$
 D $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$

15. Which formula represents carbon tetrachloride?

- A CCl
 B CCl_4
 C Cl_4C
 D CCCICl

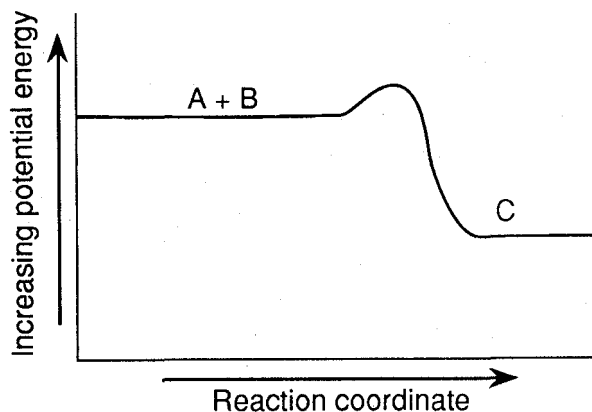
16. When the equation



is correctly balanced using the smallest whole numbers, what is the coefficient of Al(s) ?

- A 1
 B 2
 C 3
 D 4

17. The graph below represents a chemical reaction.



How is this reaction is best described?

- A endothermic, because energy is absorbed
 B endothermic, because energy is released
 C exothermic, because energy is absorbed
 D exothermic, because energy is released

18. Which electron dot diagram represents a molecule of H_2 ?

- A $\text{H} \cdot \text{H}$
 B $\text{H} : \text{H}$
 C $\begin{array}{cc} \cdot & \cdot \\ \cdot & \cdot \\ \text{H} & \cdot \\ \cdot & \cdot \\ \cdot & \cdot \end{array}$
 D $\begin{array}{cc} \cdot & \cdot \\ \cdot & \cdot \\ \text{H} & : \\ \cdot & \cdot \\ \cdot & \cdot \end{array}$

19. Salt is often used on sidewalks to help melt accumulated ice. How does the salt melt the ice?
- A by increasing the temperature of the ice
 - B by raising the melting point of the ice
 - C by increasing the temperature of the surrounding air
 - D by lowering the melting point of the ice
20. Given the reaction:
- $$\text{Mg(s)} + 2 \text{AgNO}_3(\text{aq}) \rightarrow \text{Mg(NO}_3)_2(\text{aq}) + 2 \text{Ag(s)}$$
- What type of reaction is this?
- A single replacement
 - B double replacement
 - C synthesis
 - D decomposition
21. An atom of calcium loses 2 electrons in forming a chemical compound. What now is the charge on the resulting calcium ion?
- A 1+
 - B 2+
 - C 1-
 - D 2-
22. What is the charge of an ion that consists of 10 electrons, 11 protons, and 12 neutrons?
- A 1+
 - B 2+
 - C 1-
 - D 2-
23. What substance would contain metallic bonds?
- A sulfur
 - B copper
 - C fluorine
 - D carbon
24. What can be added to an acidic solution to neutralize it?
- A hydrogen gas
 - B table salt
 - C an alcohol
 - D a base

25. What is the name of P_2O_5 ?

- A phosphorus oxide
- B phosphorus -2 oxygen -5
- C phosphorus pentoxide
- D phosphoric oxide

Base your answers to questions 26 and 27 on the data table below which shows the melting and boiling points of common substances.

Substance	Melting Point ($^{\circ}C$)	Boiling Point ($^{\circ}C$)
Water	0	100
Alcohol	-117	78
Nitrogen	-210	-196
Oxygen	-218	-183

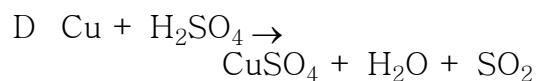
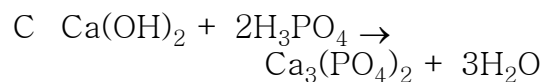
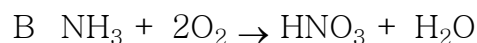
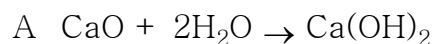
26. Which substance should be a liquid at -90 degrees?

- A alcohol
- B water
- C nitrogen
- D oxygen

27. As each substance in the table is cooled down from a temperature of $200^{\circ}C$ to $-200^{\circ}C$, what happens to their atoms and molecules?

- A They undergo a physical change as they move faster.
- B They undergo a physical change as they move slower.
- C They undergo a chemical change as they move faster.
- D They undergo a chemical change as they move slower.

28. Which equation is correctly balanced?



29. Which of these pH indicates the highest level of acidity?

A 5

B 8

C 10

D 12

30. The table below was compiled from experimental laboratory data.

INDICATOR	CHANGE	pH RANGE AT WHICH CHANGE OCCURS
Bromthymol Blue	yellow \rightarrow blue	6.2 – 7.6
Thymol Blue	red \rightarrow yellow	1.2 – 2.8
Methyl Orange	red \rightarrow yellow	3.1 – 4.4

At what pH would all three indicators appear as yellow?

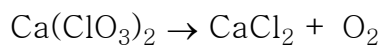
A 1.9

B 2.9

C 4.7

D 8.7

31. What type of reaction is shown below?



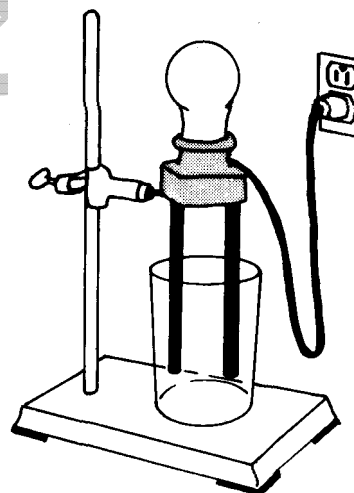
A decomposition

B double replacement

C single replacement

D synthesis

32. Which pH value indicates the most basic solution?
- A 3
B 7
C 8
D 11
33. When ethylene glycol (an antifreeze) is added to water, what happens to the boiling point of the water?
- A It decreases, and the freezing point decreases
B It decreases, and the freezing point increases
C It increases, and the freezing point decreases
D It increases, and the freezing point increases
34. Given the equation:
- $$__ \text{FeCl}_2 + __ \text{Na}_2\text{CO}_3 \rightarrow __ \text{FeCO}_3 + __ \text{NaCl}$$
- When the equation is correctly balanced using the smallest whole numbers, what is the coefficient of NaCl?
- A 2
B 3
C 4
D 6
35. The water solution of which of the following substances is the best conductor of electricity?
- A KCl
B $\text{C}_6\text{H}_{12}\text{O}_6$
C CO_2
D CO
36. If the apparatus illustrated in the diagram below is used in a conductivity test. Substances are placed into the glass to see if the bulb will light up. Which material would be the best conductor of an electric current?



- A rubbing alcohol
B distilled water
C solid salt
D salt solution

37. What type of reaction is shown below?

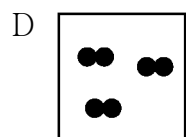
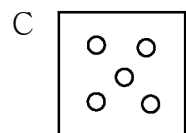
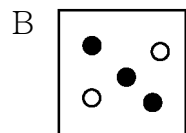
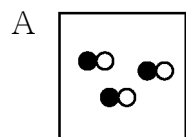


- A synthesis
- B decomposition
- C single replacement
- D exchange of ions

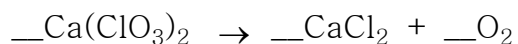
38. Given:

● = particle X
○ = particle Y

Which diagram represents a mixture?



39. When the equation



is correctly balanced, what is the coefficient in front of O_2 ?

- A 1
- B 2
- C 3
- D 4

40. The data table below represents the properties determined by the analysis of substances Q, R, S, and T.

Substance	Melting Point (°C)	Boiling Point (°C)	Conductivity
Q	-80	-20	none
R	20	190	none
S	320	770	as solid
T	800	1250	in solution

Which substance is an ionic compound?

- A Q
- B R
- C S
- D T
-
41. What is the temperature at which the solid and liquid phases of matter exist in equilibrium called?
- A melting point
- B boiling point
- C heat of fusion
- D heat of vaporization
42. Which is a correctly balanced equation for a reaction between hydrogen gas and oxygen gas?
- A $\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\ell)$
- B $\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\ell)$
- C $2\text{H}_2(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\ell)$
- D $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\ell)$
43. Given the balanced equation:
- $$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{X} + \text{H}_2$$
- What is the correct formula for the product represented by the letter X?
- A NaO
- B Na₂O
- C NaOH
- D Na₂OH

44. What is the total number of atoms in one molecule of the compound K_3PO_4 ?
- A 7
B 8
C 3
D 12

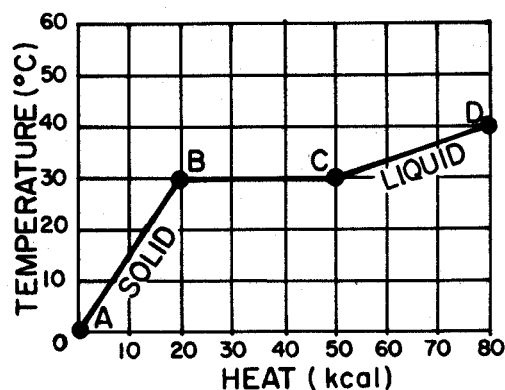
45. Element X is in Group 2 and element Y is in Group 17. A compound formed between these two elements is most likely to have what formula?

- A X_2Y
B XY_2
C X_2Y_7
D X_7Y_2

46. What is the oxidation number of zinc in ZnS ?

- A +1
B +2
C -1
D -2

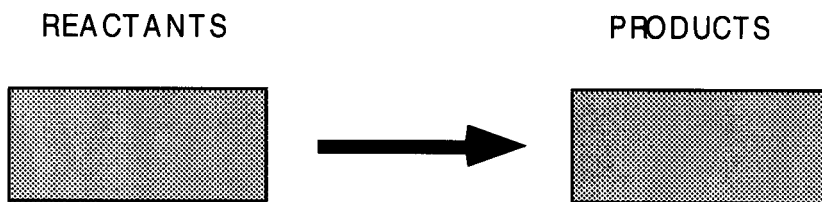
47. Base your answer to the following question on the graph below which represents the temperature vs. heat of 2.0 kilograms of a substance originally in the solid state.



What is the melting point of the substance?

- A 10°C
B 20°C
C 30°C
D 50°C
48. Which pair of atoms will combine with each other forming an ionic bond?
- A C and O
B H and H
C H and Si
D Ca and Br

49.



The diagram shows a chemical equation with the substances on either side of the equation hidden from view. From the law of conservation of mass, what would be true?

- A the products must weigh more than the reactants
- B energy is neither absorbed nor released by the reaction
- C substances do not change
- D the number of atoms on either side of the equation must be the same

50. Covalent bonds are formed when electrons are

- A transferred from one atom to another
- B captured by the nucleus
- C mobile within a metal
- D shared between two atoms

51. Which ion has the same electron configuration as an atom of helium (He)?

- A Cl^-
- B F^-
- C K^+
- D Li^+

52. Which process occurs during nuclear fission?

- A Light nuclei are forced together to form a heavier nucleus.
- B A heavy nucleus splits into lighter nuclei.
- C An atom is converted to a different isotope of the same element.
- D Transmutation is produced by the emission of alpha particles.



End of Physical
Science Exam

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