

**Science 1206
Chemistry Unit
Sample Final Exam
2004 - 05**

1.

A gas is proved to be carbon dioxide if:

- (a) a glowing splint bursts into flames in the gas.
- (b) a wet piece of red litmus goes blue in the gas.
- (c) limewater goes milky when shaken with the gas.
- (d) a burning splint causes a small explosion in the gas.
- (e) an unlit splint ignites in the gas.

2.

Ionic bonds are generally formed between:

- (a) two different gases.
- (b) alkali metals and the halogens.
- (c) elements in the top horizontal row of the periodic table.
- (d) alkaline earth metals and the noble gases.
- (e) two different metals.

3.

When atoms form chemical bonds they can:

- (a) gain electrons only;
- (b) lose electrons only;
- (c) lose, gain, or share electrons;
- (d) lose or gain electrons only;
- (e) share electrons only.

4.

An atom has a total of 18 electrons. These electrons are found in 3 orbits that have:

- (a) 6 electrons each;
- (b) 8, 8, and 2 electrons, moving out from the nucleus;
- (c) 2, 8, and 8 electrons, moving out from the nucleus;
- (d) 2, 10, and 6 electrons, moving out from the nucleus;
- (e) 4, 8, and 6 electrons, moving out from the nucleus.

5.

Classify the following reactions as physical, chemical, or neither.

- (a) zinc is added to hydrochloric acid _____
- (b) sodium bicarbonate is added to water _____
- (c) calcium carbonate is added to water _____
- (d) sugar is added to water _____
- (e) calcium carbonate is added to hydrochloric acid _____

6.

When a burning splint "pops" in the mouth of a test tube, which one of the following is present?

- (a) water vapour
- (b) oxygen
- (c) carbon dioxide
- (d) hydrogen
- (e) air

7.

In a chemical reaction, a metallic element usually:

- (a) loses electrons;
- (b) gains electrons;
- (c) shares electrons;
- (d) gains protons;
- (e) loses protons.

8.

An atom becomes an ion with a charge of +2 when it:

- (a) gains 2 proton;
- (b) loses 2 neutrons;
- (c) loses 2 electrons;
- (d) gains 2 electrons;
- (e) loses 2 protons.

9.

The set of elements containing only nonmetals is:

- (a) I, H, Ag
- (b) C, Cl, Li
- (c) Al, Sr, K
- (d) Br, Fe, He
- (e) Cl, S, P

10.

Covalent bonds are due to the:

- (a) transfer of electrons from one atom to another;
- (b) attraction between ions of opposite charge;
- (c) gain or loss of electrons by atoms;
- (d) sharing of two electrons by two atoms;
- (e) magnetic force of attraction between two atoms.

11.

A gas can be proved to be oxygen by means of:

- (a) a burning splint, which causes a small explosion or "pop";
- (b) a glowing splint, which bursts into flame;
- (c) a burning or glowing splint which goes out completely;
- (d) limewater, which goes milky when shaken with the gas;
- (e) a wet piece of litmus paper, which goes pink in the gas.

12.

A chemical change is distinguished from a physical change because, in a chemical change, the original substance changes its:

- (a) composition
- (b) size
- (c) shape
- (d) mass
- (e) state

13.

Which of the following polyatomic ions have names that end in "ate"?

- 1. ClO_3^-
- 2. OH^-
- 3. PO_4^{3-}
- 4. HCO_3^{2-}
- 5. SO_3^{2-}

- (a) 2, 3, and 4 only
- (b) 2, 3, and 5 only
- (c) 1 and 5 only
- (d) 1, 2, 4, and 5 only
- (e) 1, 3, and 4 only

14.

Select the correct corresponding name.

- (a) Sn_2SO_4 - tin(II) sulfate;
- (b) PbCO_3 - lead(IV) carbonate;
- (c) $\text{Fe}(\text{ClO}_3)_3$ - iron(III) chlorate;
- (d) Cu_2PO_4 - copper(I) phosphate;
- (e) None of these is named correctly.

15.

There is no doubt that a chemical reaction has occurred if:

- (a) there has been an overall volume change.
- (b) the form or state has been changed.
- (c) a new substance has been formed.
- (d) there has been a change of state.
- (e) heat has been given off.

16.

An atom of element X has 11 electrons and an atom of element Y has 8 electrons. The formula of the product of the reaction of these elements is expected to be:

- (a) XY
- (b) XY₂
- (c) XY₃
- (d) X₂Y
- (e) X₂Y₃

17.

Which of the following is a chemical property of a substance? The substance:

- (a) floats on the surface of mercury;
- (b) is clear and colourless;
- (c) is attracted by a magnet;
- (d) is soluble in water.
- (e) coats itself with an oxide when exposed to air.

18.

- (a) Select a halogen and sketch its energy level diagram.
- (b) Sketch the stable ion this element forms and indicate its electric charge.
- (c) Give the name of this ion.

19.

- (a) Select an alkaline earth metal and sketch its energy level diagram.
- (b) Sketch the stable ion this element forms and indicate its electric charge.

20.

Which of the following atoms or ions has an energy level arrangement that is different from the others in the list?

- (a) Ar
- (b) Mg²⁺
- (c) K¹⁺
- (d) S²⁻
- (e) Ca²⁺

21.

Give the compound name or formula as required.

Na ₂ CO ₃ _____	Sn(NO ₃) ₂ _____
Cu(OH) ₂ _____	Al(HCO ₃) ₃ _____
zinc chlorate _____	calcium phosphate _____
potassium sulfate _____	lead(IV) carbonate _____

22.

Lithium and oxygen react to form a compound.

- (a) Draw energy level diagrams of lithium and oxygen.
- (b) Which is the metal and which is the nonmetal?
- (d) What are the charges on the lithium and oxygen ions?
- (e) Give the chemical formula and the chemical name of the compound formed.

23.

Two particles have the following compositions, respectively:

- 1. 10 protons, 9 electrons
- 2. 11 protons, 10 electrons

Both of the particles are best described as:

- (a) neutral atoms
- (b) positive ions
- (c) negative ions
- (d) noble gases
- (e) compound neutrons

24.

A decomposition chemical reaction can be compared to:

- (a) two dancing couples switching partners;
- (b) eight couples doing a square dance;
- (c) a dancing couple breaking up;
- (d) two single people joining for a dance;
- (e) a single person "cutting in" on a dancing couple.

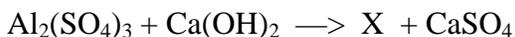
25.

A balanced chemical equation takes into account the theory that:

- (a) compounds and elements remain unchanged in a chemical reaction.
- (b) atoms are neither created nor destroyed in chemical reactions.
- (c) the total mass always increases during a chemical reaction.
- (d) the mass of any gases involved can be ignored.
- (e) atoms react by shifting or sharing protons.

26.

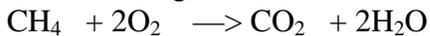
In the following equation, the " X " represents:



- (a) H_2O
- (b) $\text{Al}(\text{OH})_3$
- (c) Al
- (d) SO_2
- (e) $\text{Al}_2(\text{OH})_3$

27.

The following reaction is an example of the reaction type called:



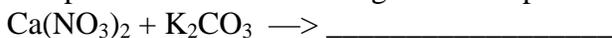
- (a) synthesis
- (b) combustion
- (c) decomposition
- (d) single displacement
- (e) double displacement

28.

Balance the following equation: $\text{PbS} + \text{O}_2 \longrightarrow \text{PbO} + \text{SO}_2$

29.

The products of the following double replacement reaction carried out in solution are:

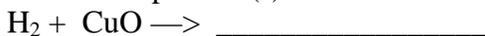


30. CaCO₃ 2. CaK₂ 3. KNO₃ 4. CO₃(NO₃)₂

- (a) 1, 2, and 3
- (b) 2, 3, and 4
- (c) 1, 2, and 4
- (d) 2 and 4
- (e) 1 and 3

31.

Predict the product(s) for the following reaction.



32. CuH₂ 2. CuO₂ 3. H₂O 4. Cu 5. Cu(OH)₂

- (a) 3 and 4 only
- (b) 5 only
- (c) 1 and 2 only
- (d) 4 and 5 only
- (e) 1 and 3 only

33.

In all chemical reactions the:

- (a) mass and volume of both the reactants and the products must be equal.
- (b) masses of the combining chemicals must be equal.
- (c) volume of the reactants equals the volume of the products.
- (d) volumes of the combining reactants must be equal.
- (e) mass of the reactants equals the mass of the products.

34.

The product(s) of the combustion of a hydrocarbon is/are:

- (a) water, carbon dioxide, and nitrogen dioxide
- (b) water only
- (c) carbon dioxide only
- (d) water and carbon dioxide
- (e) nitrogen dioxide only

35.

An example of a double displacement reaction would be:

- (a) $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- (b) $2\text{KI} + \text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{KNO}_3 + \text{PbI}_2$
- (c) $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$
- (d) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- (e) None of these is a double displacement reaction.

36.

A single displacement chemical reaction can be compared to:

- (a) two dancing couples switching partners;.
- (b) a person "cutting in" on a dancing couple;
- (c) eight couples doing a square dance;
- (d) two single people joining for a dance.
- (e) a couple breaking up.

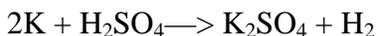
37.

What does the " \rightarrow " mean in the chemical equation: water \rightarrow hydrogen + oxygen

- (a) to produce
- (b) reacts with
- (c) a skeleton equation
- (d) is balanced
- (e) a coefficient

38.

Which chemical reaction type does the following belong to?



- (a) synthesis
- (b) decomposition
- (c) combustion
- (d) single displacement
- (e) double displacement

39.

A chemical reaction is represented by the following word equation:

magnesium + sulfuric acid \longrightarrow hydrogen + magnesium sulfate

- (a) What are the products of this reaction?
- (b) What are the reactants in this reaction?

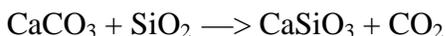
40.

A double displacement chemical reaction is the:

- (a) exchange of two different atoms between two compounds;
- (b) displacement of one element in a compound by another element;
- (c) breaking up of a compound to produce two different elements;
- (d) joining together of two elements to form a compound;
- (e) absorption of heat in a chemical reaction.

41.

What is the reaction type classification for the following equation?



- (a) double displacement
- (b) synthesis
- (c) decomposition
- (d) single displacement
- (e) none of these classifications

42.

Which of the following represents a combustion reaction?

- (a) $2\text{H}_2\text{O} \longrightarrow 2\text{H}_2 + \text{O}_2$
- (b) $2\text{KClO}_3 \longrightarrow 2\text{KCl} + 3\text{O}_2$
- (c) $\text{C}_2\text{H}_6 + \text{O}_2 \longrightarrow 3\text{H}_2\text{O} + 2\text{CO}_2$
- (d) $2\text{KI} + \text{Pb}(\text{NO}_3)_2 \longrightarrow 2\text{KNO}_3 + \text{PbI}_2$
- (e) $2\text{Cu} + \text{S} \longrightarrow \text{Cu}_2\text{S}$

43.

Balance and classify each of the following as either a synthesis or a decomposition reaction.

- (a) $\text{HgO} \longrightarrow \text{Hg} + \text{O}_2$
- (b) $\text{Al} + \text{O}_2 \longrightarrow \text{Al}_2\text{O}_3$
- (c) $\text{SO}_3 + \text{H}_2\text{O} \longrightarrow \text{H}_2\text{SO}_4$

44.

What does the "+" mean in the chemical equation: phosphorus + oxygen \rightarrow phosphorus(V) oxide

- (a) a skeleton equation
- (b) to produce
- (c) reacts with
- (d) a coefficient
- (e) is balanced

45.

Pentane, C_5H_{12} , is a hydrocarbon gas easily kept as a liquid under pressure.

- (a) Write out a word equation for the complete combustion of pentane.
- (b) Write out the balanced chemical equation for the complete combustion of pentane.

46.

Identify each of the following reactions as a synthesis, decomposition, single displacement, double displacement, or combustion.

- (a) $Mg(OH)_2 + 2HNO_3 \rightarrow Mg(NO_3)_2 + 2H_2O$
- (b) $H_2O + SO_3 \rightarrow H_2SO_4$
- (c) $CaBr_2 + Cl_2 \rightarrow Br_2 + CaCl_2$
- (d) $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$

47.

- (a) Complete the following equation and balance it. $Bi_2O_3 + H_2 \rightarrow$
- (b) Classify the reaction type.

48.

An acid would have which of the following properties? An acid solution:

- (a) turns litmus blue and red cabbage indicator yellow;
- (b) tastes sour;
- (c) feels slippery;
- (d) could have a pH of 12;
- (e) would not react with baking soda.

49.

A solution with a pH of 2 is said to be:

- (a) strongly acidic
- (b) slightly basic
- (c) slightly acidic
- (d) strongly basic
- (e) neutral

50.

A solution with a pH of 7 is said to be:

- (a) strongly acidic
- (b) slightly basic
- (c) slightly acidic
- (d) strongly basic
- (e) neutral

51.

A solution has a pH of 8. How is this solution best described?

- (a) strongly basic
- (b) slightly basic
- (c) slightly acidic
- (d) strongly acidic
- (e) neutral