

SAT CHEMISTRY PRACTICE PAPER 4

SET 1

1. The modern periodic table is arranged based upon atomic

- A. isotopes
- B. number
- C. density
- D. radius
- E. mass

2. In period 3 of the periodic table the atom with the largest atomic radius is located in group

- A. 1
- B. 3
- C. 13
- D. 17
- E. 18

3. The elements that display the greatest nonmetallic character are located toward which corner of the periodic table?

- A. Upper left
- B. Dead center
- C. Lower right
- D. Lower left
- E. Upper right

4. Which two elements will display the most similar chemical properties?

- A. Aluminum and calcium
- B. Nickel and phosphorus
- C. Chlorine and sulfur
- D. Carbon and sulfur
- E. Lithium and potassium

5. Assuming the ground state, all of the elements located in group 13 of the periodic table will have the same number of

- A. nuclear particles

B. occupied principal energy levels

C. electrons

D. valence electrons

E. neutrons

6. Which group contains elements in the solid, liquid, and gas phases at 298 K and 1 atm?

A. 1

B. 2

C. 16

D. 17

E. 18

7. An element that has a high first ionization energy and is chemically inactive would most likely be

A. a noble gas

B. a transition element

C. an alkali metal

D. a halogen

E. an alkaline earth metal

8. Which salt solution is most likely to be colored?

A. KClO_3 (aq)

B. KNO_3 (aq)

C. K_2CrO_4 (aq)

D. K_2SO_4 (aq)

E. KCl (aq)

9. As the elements of period 2 are considered from left to right, there is generally a decrease in

A. ionization energy

B. electronegativity

C. metallic character

D. nonmetallic character

E. none of the above

10. Which element is a liquid at room temperature?

- A. K
- B. Hg
- C. I₂
- D. Mg
- E. Kr

11. At STP, which element is most expected to exist as a monatomic gas?

- A. Calcium
- B. Hydrogen
- C. Nitrogen
- D. Neon
- E. Bromine

12. Nonmetals are poor conductors of heat and they also tend to

- A. be brittle
- B. conduct an electrical current
- C. have a shiny luster
- D. be malleable
- E. lose electrons

13. Which statement does not explain why elements in a group are placed together?

- A. They tend to have the same number of valence electrons.
- B. They tend to have a similar oxidation number.
- C. They tend to have the same electronegativities.
- D. They tend to have the same chemical reactivity.
- E. They tend to have the same charge when they form ions.

SET 2

1. Which substance has a polar covalent bond between its atoms?

- A. K₃N
- B. Ca₃N₂

C. NaCl

D. F₂

E. NH₃

2. Which kinds of bonding can be found in a sample of H₂O(l)?

A. Hydrogen bonds only

B. Nonpolar covalent bonds only

C. Ionic and nonpolar hydrogen bonds

D. Both polar covalent and hydrogen bonds

E. Metallic and ionic bonds

3. When an ionic compound is dissolved in water, the ions in solution can best be described as

A. hydrated molecules only

B. dehydrated ions and molecules

C. both hydrated molecules and hydrated ions

D. neither hydrated ions nor hydrated molecules

E. hydrated ions only

4. Which substance represents a molecule that can combine with a proton (H¹⁺)?

A. NH₃

B. Na¹⁺

C. HCl

D. H₃O¹⁺

E. H

5. Which compound contains no ionic character?

A. NH₄Cl

B. CaO

C. K₂O

D. Li₂O

E. CO

6. The forces of attraction that exist between nonpolar molecules are called

A. Van der Waals / dispersion forces

B. ionic bonds

C. covalent bonds

D. electrovalent bonds

E. metallic bonds

7. Which substance is a network solid?

A. Li_2O

B. SiO_2

C. H_2O

D. CO_2

E. NaCl

8. Which molecule is a polar molecule?

A. N_2

B. H_2O

C. CH_4

D. CO_2

E. KCl

9. Which is the chemical formula for iron(III) sulfate?

A. Fe_2SO_4

B. Fe_3SO_4

C. $\text{Fe}(\text{SO}_4)_3$

D. $\text{Fe}_2(\text{SO}_4)_3$

E. Fe_2S_3

10. In which of the following compounds are hydrogen bonds between molecules the strongest?

A. HF

B. HCl

C. HBr

D. HI

E. HAt

11. When a salt dissolves in water, the water molecules are attracted by ions in solution. This attraction is called

A. atom-atom

B. molecule-molecule

C. molecule-ion

D. ion-ion

E. atom-ion

12. Which element is expected to have a “sea” of electrons?

A. Hydrogen

B. Nitrogen

C. Cobalt

D. Chlorine

E. Oceanium

13. In which of the following liquids are the Van der Waals forces of attraction between the molecules weakest?

A. Xe

B. Kr

C. Ar

D. Ne

E. He

14. Which molecule has both nonpolar intramolecular and nonpolar intermolecular bonds?

A. CCl_4

B. CO

C. HF

D. HCl

E. F_2

15. The name of the compound MgBr_2 is

A. manganese bromite

B. manganese bromide

C. magnesium bromite

D. magnesium bromide

E. magnesium dibromide

16. The anion S^{2-} is called

A. sulfide

B. sulfite

C. sulphorus

D. sulfuron

E. sulfate

17. The compound PF_5 is called

A. monophorofluoride

B. phosphorus pentafluoride

C. pentaphosphoro fluoride

D. phosphorus tetrafluoride

E. potassium pentafluoride

18. Element X forms the compounds XCl_3 and X_2O_3 . Element X would most likely belong to the group called

A. alkali metals

B. alkaline earth metals

C. group 13

D. halogens

E. noble gases

19. When oxygen reacts with an alkali metal the general formula of the compound will be

A. MO_2

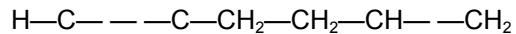
B. M_2O

C. M_2O_3

D. M_3O_2

E. MO

20. How many sigma and pi bonds are found in the following molecule?



- A. There are 3 pi bonds and 13 sigma bonds.
- B. There are 12 sigma bonds and 5 pi bonds.
- C. There are 12 sigma bonds and 2 pi bonds.
- D. There are 2 pi bonds and 4 sigma bonds.
- E. There are 8 sigma bonds and 2 pi bonds.

SET 3

1. What is the mass of 3.0×10^{23} atoms of neon gas?

- A. 0.50 grams
- B. 1.0 grams
- C. 5.0 grams
- D. 40.0 grams
- E. 10.0 grams

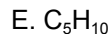
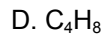
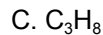
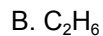
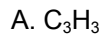
2. A compound has a composition of 40% sulfur and 60% oxygen by mass. What is the empirical formula of this compound?

- A. SO
- B. S₂O₃
- C. S₂O₇
- D. SO₃
- E. SO₂

3. What is the total number of atoms represented in one molecule of (CH₃)₂NH?

- A. 5
- B. 8
- C. 9
- D. 10
- E. 12

4. A hydrocarbon has the empirical formula CH_3 . A probable molecular formula for this compound could be



5. The chemical symbol Ar could stand for

A. one mole of argon

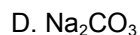
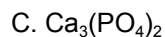
B. one atom of argon

C. both a mole or an atom of argon

D. neither a mole or an atom of argon

E. one molecule of argon

6. Which salt has a solubility that is different from the other four?



7. A solution of a salt and 100 grams of water that can still dissolve more solute at a given temperature is classified as

A. unsaturated

B. supersaturated

C. saturated

D. dilute

E. concentrated

8. The net ionic equation for the reaction between CaCl_2 and Na_2CO_3 to form calcium carbonate and sodium chloride would include all of the following except:



C. 2Na^{1+}

D. CaCO_3

E. All of the substances above would be in the net ionic equation.

9. Which solution listed below is going to have the highest boiling point?

A. 1.5 m NaCl

B. 1.5 m AgCl

C. 2.0 m $\text{C}_6\text{H}_{12}\text{O}_6$

D. 2.0 m CaCl_2

E. 1.0 m $\text{Al}_2(\text{SO}_4)_3$

10. Which equation is correctly balanced?

A. $\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$

B. $\text{CH}_4 + 3\text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$

C. $2\text{KI} + \text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{KNO}_3 + \text{PbI}_2$

D. $\text{H}_2\text{SO}_4 + \text{KOH} \rightarrow \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$

E. $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + \text{H}_2\text{O}$

11. 110 grams of KF are dissolved in water to make 850 ml of solution. What is the molarity of the solution?

A. 0.129 M

B. 0.620 M

C. 0.002 M

D. 0.068 M

E. 2.23 M

12. Given one mole of $\text{CH}_4(\text{g})$ as STP. Which statements are true?

I. There are 6.02×10^{23} molecules present.

II. The sample will occupy 22.4 l.

III. The sample will weigh 16 g.

A. I only.

B. II only.

C. I and III only.

D. II and III only.

E. I, II, and III.