SAT CHEMISTRY PRACTICE PAPER 3
SET 1

1. Which substance can be decomposed chemically?

A. Ammonia

B. Iron

C. Neon

D. Hydrogen

E. Fluorine

2. Which units could be used to express the amount of energy absorbed or released during a chemical reaction?

A. Degree and gram

B. Torr and mmHg

C. Gram and liter

D. Calorie and joule

E. Meter and cm^3

3. Which sample represents a homogeneous mixture?

A. $CH_3OH(l)$

B. $CH_3OH(aq)$

C. $CH_3OH(g)$

D. $CH_3OH(s)$

E. None of the above

4. A book is lifted off of the floor and placed on a table that is one meter above the floor. The book has

A. gained sound energy

B. lost chemical energy

C. gained potential energy

D. gained kinetic energy

E. lost nuclear energy

5. Which statement is incorrect regarding energy?

A. Energy can be given off in a reaction.

B. Energy can be gained in a reaction.

C. Energy cannot be created or destroyed.

D. Energy can take various forms.

E. Energy has mass and takes up space.

6. What is the mass of an object that has a density of 13 g/mL and a volume of 10 mL?

A. 1.3 g/mL

B. 0.77 g/mL

C. 1.3 g/L

D. 130 g

E. 130 g/L

7. Which sentence below is incorrect?

A. Salads are heterogeneous mixtures.

B. NaCl(aq) is a homogeneous mixture.

C. Milk is a heterogeneous mixture.

D. Sand and water make a heterogeneous mixture.

E. Pure iron is a heterogeneous mixture.

8. Which type of change is different from the other four?

A. Baking a potato

B. Rusting of an iron nail

C. Burning a piece of paper

D. Melting an ice cube

E. Ignition of propane

9. Which of the following is not a physical property?

A. Color

B. Phase

C. Odor

D. Boiling point

E. Reactivity with oxygen

10. Which substance cannot be decomposed chemically?

A. Ammonia

B. Tellurium

C. Methane

D. Water

E. Lunch

11. The study of matter is called

A. Chemistry

B. Biology

C. Geology

D. Physics

E. Psychology

SET 2

1. Which gas under a high temperature and a low pressure behaves most like an ideal gas?

A. He

B. O_2

C. NH_3

D. CO_2

E. Ne

2. Which sample demonstrates particles arranged in a regular geometric pattern?

A. $CO_2(g)$

B. $CO_2(s)$

C. $CO_2(l)$

D. $CO_2(aq)$

E. None of the above

3. At which temperature does a water sample have the highest average kinetic energy?

A. 0 degrees Celsius

B. 100 degrees Celsius

C. 0 K

D. 100 K

E. 273 K

4. A liquid will boil when

A. its freezing point is equal to its melting point

B. a salt has been added to the liquid

C. its vapor pressure is equal to the melting point

D. it is heated to a temperature that is below the boiling point

E. its vapor pressure is equal to the surrounding pressure

5. Which gas is expected to have the highestrate of effusion?

A. O_2

B. F_2

C. H_2O

D. He

E. CH_2

6. Which phase change is described correctly?

A. Solid to gas is called deposition.

B. Gas to solid is called sublimation.

C. Liquid to solid is called freezing.

D. Solid to liquid is called vaporization.

E. Liquid to gas is called condensation.

7. A solid, liquid, and gas can exist together at the

A. sublimation point

B. triple point

C. boiling point

D. freezing point

E. melting point

8. A mixture of gases exists in a sealed container with the following percentages: helium 40%, neon 50%, and argon 10%.If the total pressure of the gases is 1100 torr, then which of the following is true about these gases?

A. Volume and temperature have an inversely proportional relationship.

B. Volume and pressure have a direct relationship.

C. The partial pressure of the neon gas is 550 torr.

D. The partial pressure of the argon gas is 100 torr.

E. The partial pressures of the gases cannot be calculated with the given information.

9. Which of the following gases is expected to have the lowest density at STP?

A. SO_2

B. CO_2

C. Cl_2

D. Xe

E. Ar

10. An ideal gas at STP occupies 22.4 liters. If the pressure on the gas is increased to 1000 torr and the temperature of the gas is reduced to 250 K, what can be said about the gas?

A. The number of moles of the gas has changed.

B. The volume of the gas has increased.

C. The volume of the gas has decreased.

D. The pressure and the temperature have an inversely proportional relationship.

E. None of the above.

11. Which is inconsistent with the Kinetic Molecular Theory?

A. Gas molecules have forces of attraction for each other.

B. Gas molecules move in a random, straight-line motion.

C. Gas molecules have a negligible volume compared to the volume they occupy.

D. Collisions between gas molecules lead to a transfer of energy that is conserved.

E. All of the above statements are correct.

SET 3

1. Which of the following isotopes has the greatest number of neutrons?

A. ^{35}Cl

B. ^{31}P

C. ^{40}Ar

D. ^{41}Ca

E. ^{14}C

2. An atom has eight electrons in a 3d subshell. How many orbitals in this subshell have an unpaired electron?

A. 1

B. 2

C. 3

D. 4

E. 5

3. Which principal energy level has exactly four subshells?

A. 1

B. 2

C. 3

D. 4

E. 5

4. An atom in the ground state has seven valence electrons. Which electron con??guration could represent the valence electron con??guration of this atom in the ground state?

A. $3s^1 3p^6$

B. $3s^6 3p^1$

C. $3s^1 3p^4 3d^2$

D. $3s^3 3p^4 3d^1$

E. $3s^2 3p^5$

5. How many valence electrons are in an atom with the con??guration $1s^2 2s^2 2p^6 3s^2 3p^2$?

A. 6

B. 5

C. 4

D. 3

E. 2

6. Which electron conguration demonstrates an atom in the excited state?

A. $1s^2 2s^1$

B. $1s^2 2s^2 2p^4$

C. $1s^2 2s^2$

D. $1s^2 2s^2 2p^6 3s^2$

E. $1s^2 2s^2 3s^1$

7. Which pair of symbols below show different isotopes of the same element?

A. $^{39}_{18}A$ and $^{39}_{19}R$

B. $^{60}_{27}X$ and $^{59}_{28}Y$

C. $^{12}_{6}L$ and $^{14}_{6}L$

D. $^{37}_{17}X$ and $^{37}_{17}X$

E. $^{3}_{2}E$ and $^{3}_{1}G$

8. Which of the following is not a conclusion Rutherford made from his experiment with alpha particles being shot at a thin sheet of gold foil?

A. An atom has a very small, compact nucleus.

B. An atom is mainly empty space.

C. An atom's mass is concentrated in the nucleus.

D. An atom has a very dense nucleus.

E. An atom has a negatively charged nucleus.

9. Which atom is not paired with its correction and ionic charge?

A. Rb / Rb^{1-}

B. Mg / Mg^{2+}

C. F / F^{1-}

D. Li / Li^{1+}

E. Br / Br^{1-}

10. Which of the following statements is false regarding sub-atomic particles?

A. The proton has a positive one charge.

B. The neutron has no charge.

C. The electrons are found in regions of the atom called orbitals.

D. The electrons have a greater mass than the protons.

E. Protons and neutrons are the nucleons of the atom.

11. Which is inconsistent with the concept of an isotope?

A. Same atomic number

B. Different number of neutrons

C. Same mass number

D. Same name of the element

E. Same number of protons

12. A mysterious element has the following relative abundances:

X-34 15% X-35 20% X-36 65%

Which of the following is true?

A. The atomic mass of this element is closer to 34.1.

B. The atomic mass of this element is closer to 34.9.

C. The atomic mass of this element cannot be determined without knowing exactly what X is.

D. A mass spectrophotometer would not be helpful in determining the percentages of the isotopes.

E. The atomic mass of this element is approximately 35.5.

13. Which of the following ions will be the smallest in the isoelectronic series?

A. Osup>2–

B. F^{1-}

C. Ne

D. Na^{1+}

E. Mg^{2+}

14. What is the correct set of quantum num bers for the eighth electron that fills the orbitals in an atom of oxygen?

A. n = 2, l = 1, ml = –1, ms = –1/2

B. n = 2, l = 1, ml = +1, ms = –1/2

C. n = 2, l = 1, ml = +1, ms = +1/2

D. n = 2, l = 0, ml = –1, ms = +1/2

E. n = 1, l = 1, ml = +1, ms = –1/2

15. Which of the following is not true about the effective nuclear charge felt by the valance electrons of the following atoms?

A. Z_{eff} for the valence electrons of Mg is 2+.

B. Z_{eff} for the valence electrons of Na is 2+.

C. Z_{eff} for the valence electrons of Be is 2+.

D. Z_{eff} for the valence electrons of Ne is 8+.

E. Z_{eff} for the valence electrons of Li is 1+.