Name: _____ **Class:** _____ **Date:** _____ **ID: B**

Chemistry Midterm Exam 2018-2019

Multiple Choice *(1 point each)*
Identify the choice that best completes the statement or answers the question.

____ 1. **The elements that are characterized by the presence of an incomplete *d* sublevel are called —**
a. transition elements
b. halogens
c. alkali earth metals
d. lanthanoids

____ 2. **The formula for lithium nitride is —**
a. Li_3N_3
b. Li_3N
c. NLi_3
d. LiN

____ 3. **Which of the following is the name for PCl_3?**
a. Potassium trichloride
b. Phosphorus chloride
c. Potassium chloride
d. Phosphorus trichloride

____ 4. **Under ordinary conditions of temperature and pressure, the particles in a gas are**
a. unevenly distributed.
b. very far from each other.
c. closely packed.
d. held in fixed positions.

____ 5. **A neutral atom of aluminum-27 contains —**
a. 13 electrons, 14 protons, and 13 neutrons
b. 13 electrons, 13 protons, and 14 neutrons
c. 13 protons and 27 electrons
d. 14 protons and 13 neutrons

____ 6. **When naming a transition metal that has more than one oxidation number (charge), the numeric value of the oxidation number (charge) is indicated by a —**
a. Greek prefix
b. suffix
c. Roman numeral
d. subscript

____ 7. **A student conducted an experiment to study the effects of temperature on the time it takes to complete a chemical reaction. The student's experimental conditions are shown below.**

	Trial Number			
	1	2	3	4
Temperature	17°C	18°C	20°C	16°C
Amount of A	5g	5g	5g	5g
Amount of B	7g	7g	7g	7g
Time for reaction to complete (min)	10	8	5	3

Which of the following would improve the student's experimental design?
a. Decrease the quantity of reactants
b. Keep the reaction times constant
c. Keep all tubes at 18° C
d. Have multiple trials for each temperature

____ 8. **To which group of the periodic table do lithium and potassium belong?**
a. noble gases
b. halogens
c. transition metals
d. alkali metals

____ 9. **A scientist has found the following isotope of oxygen:**

$^{19}_{8}O$

How many neutrons are present in this isotope?
a. 11
b. 8
c. 27
d. 19

____ 10. **For an experiment, 9.7 mL of HCl are needed. What is the best instrument to use for measuring this volume?**
a. Beaker
b. Graduated cylinder
c. Test tube
d. Erlenmeyer flask

____ 11. **Which of these describes a tendency for electronegativity as displayed on the periodic chart?**
a. electronegativity increases right to left across a period
b. electronegativity increases, then decreases from top to bottom down a group.
c. electronegativity decreases top to bottom down a group.
d. electronegativity decreases left to right across a period.

	Protons	Neutrons	Electrons
1	11	12	10
2	1	0	2
3	15	16	15
4	20	20	18

____ 12. **Which of these is an ion with a charge of 1-?**
a. 3
b. 4
c. 1
d. 2

____ 13. **Which element naturally occurs as a diatomic molecule?**
a. K
b. Zn
c. C
d. H

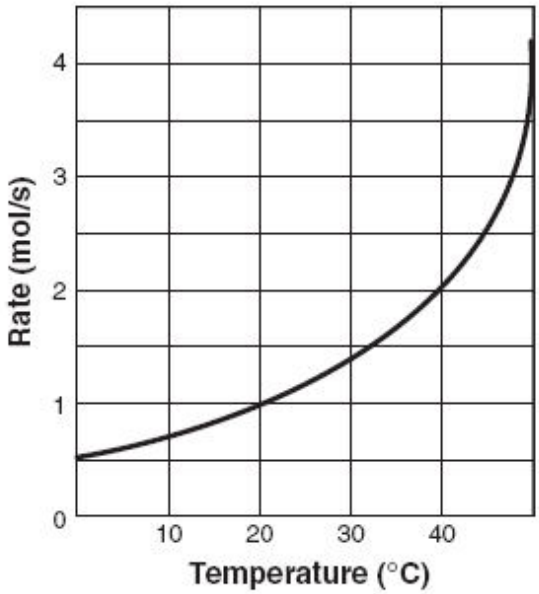
____ 14. **An increase in atomic number is related to an increase in atomic mass because —**
a. more protons are present in the atomic nucleus
b. more electrons are orbiting the atomic nucleus
c. more electrons are present in the atomic nucleus
d. more protons are orbiting the atomic nucleus

____ 15. **Atoms of the same element must —**
a. contain the same number of neutrons
b. have the same mass number
c. have equal numbers of protons and neutrons
d. contain the same number of protons

____ 16. **Elements in a group or column in the periodic table can be expected to have similar**
a. atomic masses.
b. properties.
c. numbers of neutrons.
d. atomic numbers.

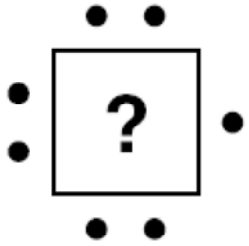
____ 17. **Three elements, X, Y, and Z, have consecutive increasing atomic numbers. If element X is a noble gas, what will be the symbol for the ion of element Z in its compounds?**
a. Z^{2+}
b. Z^{+}
c. Z^{2-}
d. Z^{-}

____ 18.



The graph shows the rate of a certain reaction as a function of temperature. According to the graph, in order to double the rate of the reaction at 20°C, the temperature must be *increased* by approximately —

a. 20°C
b. 40°C
c. 30°C
d. 10°C



____ 19. **Which of the groups below has the electron dot structure shown above?**

a. Alkali metals
b. Noble gases
c. Halogens
d. Transition elements

____ 20. **The answer to the problem 36.47 cm + 2.721 cm + 5.1 cm = should be recorded as**

a. 44 cm
b. 44.3 cm
c. 44.291 cm
d. 44.29 cm

____ 21. **Which of the following elements should be classified as a semi-metal?**

a. I
b. Sn
c. Br
d. As

____ 22. **Which scientist was the first to conclude through experimentation with cathode ray tubes that atoms have negatively charged particles?**

a. Rutherford
b. Mosley
c. Thomson
d. Bohr

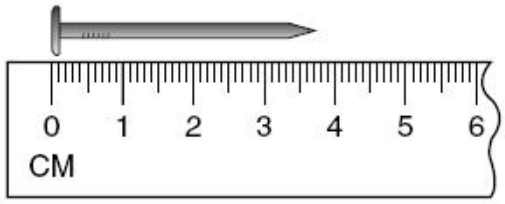
____ 23. **The element chlorine exists as two naturally occurring isotopes. Cl-35 occurs 75% of the time and Cl-37 occurs 25% of the time. Which of the following calculations should be used to calculate the correct average atomic mass of chlorine?**

a. $\dfrac{(35\ \text{amu} \times 3) + 37\ \text{amu}}{2}$

b. $\dfrac{35\ \text{amu} + 37\ \text{amu}}{2}$

c. $\dfrac{(35\ \text{amu} \times 3) + 37\ \text{amu}}{3}$

d. $(35\ \text{amu} \times .75) + (37\ \text{amu} \times .25)$



____ 24. **A student used the above ruler to measure the length of a nail. The length of this nail, according to the precision of the ruler, is —**

a. 3.75 cm
b. 3.55 cm
c. 3.7 cm
d. 3.5 cm

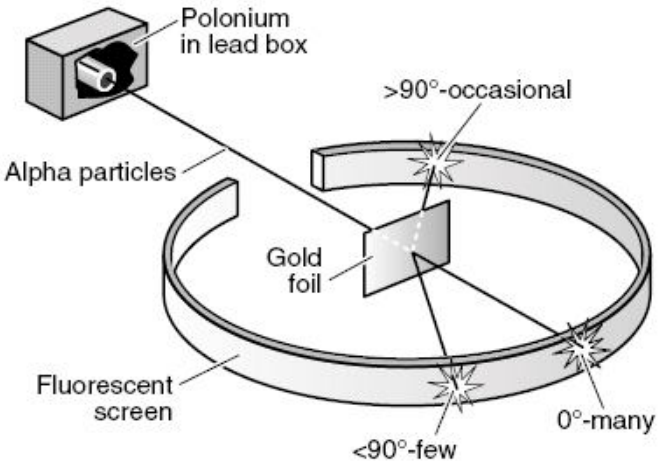
Electronegativity Values of Some Atoms

2.1 H						
1.0 Li	1.5 Be	2.0 B	2.5 C	3.0 N	3.5 O	4.0 F
0.9 Na	1.2 Mg	1.5 Al	1.8 Si	2.1 P	2.5 S	3.0 Cl
0.8 K	1.0 Ca				2.4 Se	2.8 Br

____ 25.

Electronegativity differences are often helpful in determining the bond character between two atoms. A general rule states that if the electronegativity difference between two atoms is greater than 1.67, an ionic bond would most likely be formed. Using the chart above, which pair of atoms would probably form the strongest ionic bond?

a. Ca-O
b. Na-Cl
c. Al-P
d. Mg-Br



____ 26.

Which of these conclusions can be drawn from Rutherford's experiment?

a. Atoms are mostly empty space.
b. Each atom contains protons.
c. Each atom contains electrons.
d. The nucleus of an atom can be split.

____ 27. **How should 0.000365 be expressed in proper scientific notation?**

a. 3.65
b. 3.65×10^{4}
c. 365
d. 3.65×10^{-4}

____ 28. **In the nuclear reaction, $^{230}_{90}$Th --> ____ + $^{230}_{89}$Ac, what kind of decay is observed?**

a. beta decay
b. gamma radiation
c. positron emission
d. alpha decay

____ 29. **According to the Aufbau Principle, ____.**

a. an orbital may be occupied by only two electrons
b. electrons enter orbitals of highest energy first
c. electrons in the same orbital must have opposite spins
d. electrons enter orbitals of lowest energy first

____ 30. **Which of the following properties decreases from left to right across a period?**

a. Ionization energy
b. Electronegativity
c. Atomic number
d. Atomic radius

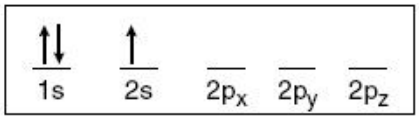
____ 31. **If a student's hand is accidentally exposed to an acidic solution, what should be done?**

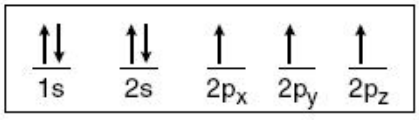
a. Rinse the hand in running water.
b. Cover the hand with oil.
c. Rinse the hand in concentrated base.
d. Wrap the hand in paper towels.

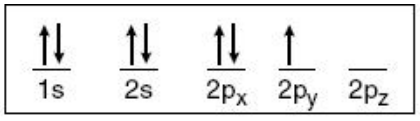
____ 32. **An element that has an electron configuration of [He]2$s^2$2p^3 is in Group _____ of the periodic table.**

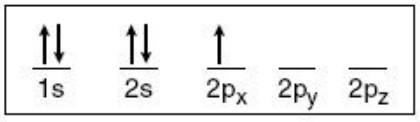
a. 13
b. 15
c. 3
d. 2

____ 33. **Which of the following orbital diagrams is *incorrect* because it violates Hund's rule?**

a. 

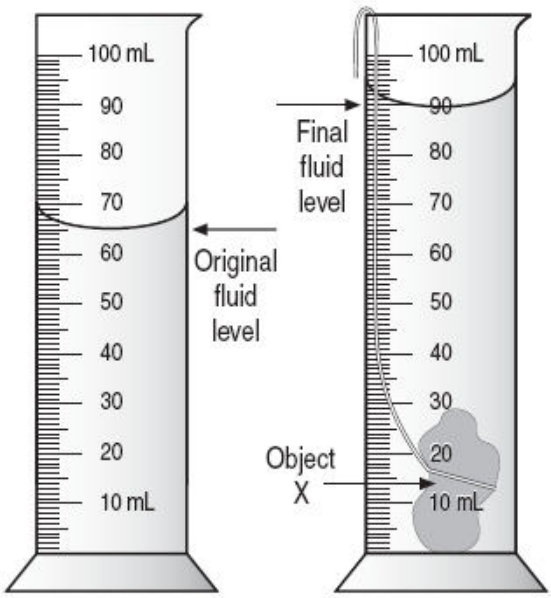
b. 

c. 

d. 

____ 34. **Which of these shows a volume of 1.25 liters expressed in milliliters?**

a. 125 mL
b. 1.25 x 10^3 mL
c. 12.5 x 10^1 mL
d. 1.25 x 10^2 mL



____ 35.
If the mass of Object X is 50.0 grams, what is its density?
a. 25.0 g/ mL
b. 0.500 g/mL
c. 0.600 g/mL
d. 2.00 g/mL

____ 36. **How does a covalent bond differ from an ionic bond?**
a. An ionic bond is usually between two metals and a covalent bond is usually between two nonmetals.
b. An ionic bond involves 2 electrons and a covalent bond involves 4 electrons.
c. An ionic bond is the transfer of electrons and a covalent bond is a sharing of electrons.
d. Ionic bonds are usually found in acids and covalent bonds are usually found in bases.

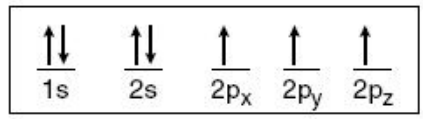
____ 37. **A student measured the temperature of a boiling solution and found it to be 36.0°C at standard pressure. The theoretical temperature of that boiling solution is 35.0°C. What is the percent error in the student's measurement?**
a. 29%
b. 0.029%
c. 0.29%
d. 2.9%

____ 38. **What is the *main* similarity among elements in group 17?**
a. Mass number
b. Atomic radius
c. Chemical properties
d. Boiling point

____ 39. **A student wanted to obtain a very accurate value for the volume of a piece of steel. He filled a 100.0 cm³ graduated cylinder to the 50.0 cm³ mark with water. After he carefully dropped the steel into the cylinder, the water level rose to the 55.6 cm³ level. He reported the volume of the steel as 5.6 cm³. How could the student improve the reliability of his analysis?**

a. Mass the steel and report its density in g/cm³
b. Repeat the measurement many times and report an average value
c. Fill the graduated cylinder to the 70.0 cm³ mark before adding the steel
d. Report the volume as 56 mm³

____ 40. **Which of the following orbital diagrams is *incorrect* because it violates the Pauli Exclusion Principal?**

a.


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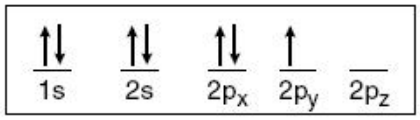

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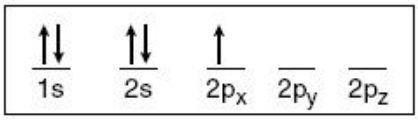
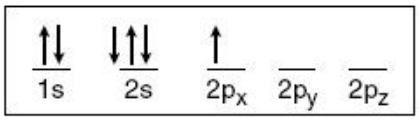
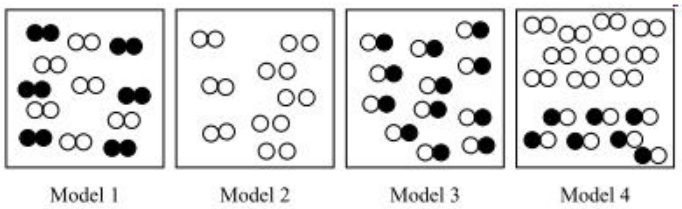


d.


____ 41.



Which model represents a compound?

a. Model 3
b. Model 2
c. Model 1
d. Model 4

____ 42. **What is the half-life of an isotope if 125 g of a 500 g sample of the isotope remains after 3.0 years?**

a. 2.5 years
b. 3.5 years
c. 4.5 years
d. 1.5 years

The following data were collected. The volume of the gas is known to be 2.20 L.

Gas Volume Data

Trial	Measured Volume (L)
1	5.20
2	5.20
3	5.19
4	5.20
5	5.20

This data reflects —

____ 43.

a. high precision and high accuracy
b. low precision and low accuracy
c. low precision and high accuracy
d. high precision and low accuracy

____ 44. **Balance the following equation**: ${}^{226}_{88}\mathrm{Ra} \rightarrow {}^{226}_{89}\mathrm{Ac} + \mathbf{?}$

a. ${}^{0}_{-1}\mathrm{e}$
b. ${}^{4}_{2}\mathrm{He}$
c. ${}^{1}_{1}\mathrm{H}$
d. ${}^{1}_{0}\mathrm{n}$

____ 45. **The reaction times for three trials of an experiment are 10.6, 10.7, and 10.9 seconds. Which average time is expressed using the correct number of significant figures?**

a. 10.7
b. 10.73
c. 10.733
d. 11

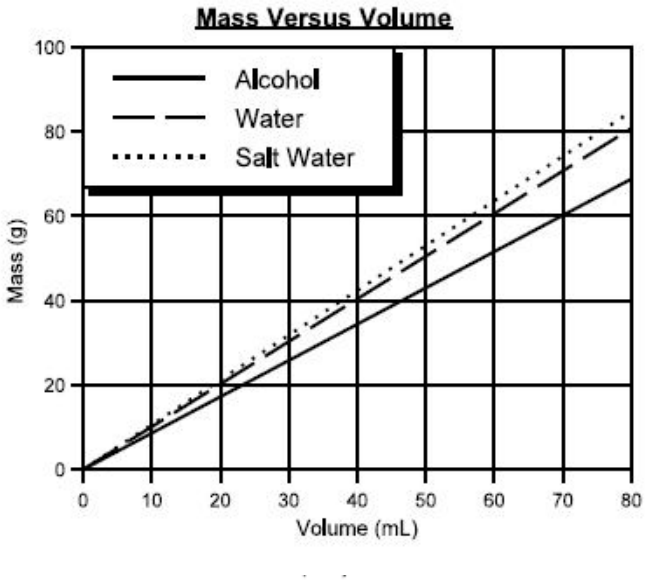
____ 46. **An element has an electron configuration of $1s^2 2s^2 2p^6$. Which of these will be in the same group as this element?**

a. $1s^2 2s^2 2p^6 3s^1$
b. $1s^2 2s^2 2p^6 3s^2 3p^6$
c. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
d. $1s^2 2s^2$

____ 47. **In chemical compounds, covalent bonds form when —**
a. electrons are completely transferred between two metals
b. two nonmetal ions are attracted to each other by opposite charges
c. the electronegativity difference between two atoms is very large
d. pairs of electrons are shared between two nonmetal atoms

____ 48. **How does the radioactive isotope Cl-37 differ from its stable counterpart Cl-35?**
a. It has a different number of protons and two more neutrons than Cl-35.
b. It has a different number of protons and two less neutrons than Cl-35.
c. It has the same number of protons but two more neutrons than Cl-35.
d. It has the same number of protons and two more electrons than Cl-35.

____ 49.



Using the graph above, determine which substance is less dense than water.
a. Alcohol is less dense than water
b. Salt water and alcohol have the same density of water
c. Salt water is less dense than water
d. Density can not be determined using this graph

____ 50. **A chemical change occurs when**
a. salt deposits form from evaporated seawater.
b. ethanol is purified through distillation.
c. dissolved minerals solidify to form a crystal.
d. a leaf changes color.