

# CHEMISTRY FINAL EXAM REVIEW



# PHYSICAL vs. CHEMICAL

- ∞ This section will test your knowledge on physical vs. chemical properties of matter.

# QUESTION 1

- Below is a list of changes, name all the changes that have to do with chemical reactions.

Bubbling/ Fizzing

Creation of light

Melting

Dissolving

Changes in temperature on their own

Color with Dyes

Formation of a Precipitate

Breaking

# QUESTION 2

A characteristic of a pure substance is that all pure substances...

- ☞ A. Cannot be separated by physical means.
- ☞ B. Can be separated by physical means.
- ☞ C. Can be separated by using filters.
- ☞ D. Cannot be separated chemically.

# QUESTION 3

Evaporation, condensing, vaporizing, solidifying, melting, and freezing are all examples of what?

MORE THAN ONE ANSWER MAY BE CORRECT.

- ☞ A. matter being lost
- ☞ B. physical changes
- ☞ C. chemical properties
- ☞ D. changes in state.

# PERIODIC KNOWLEDGE

- ⌘ This round tests you on your knowledge of the organization of the periodic table

# QUESTION 4

Which statement is true about the modern periodic table?

- ☞ A) A period is a complete horizontal row of elements of similar chemical character
- ☞ B) Elements behave in the same way when the outer shell contains the same number of electrons
- ☞ C) About 1/4 of the elements are metals
- ☞ D) A group is a vertical column of very different elements

# QUESTION 5

Elements in the same group of family have what in common?

MORE THAN 1 ANSWER MAY BE CORRECT

- ☞ A) Atomic structure
- ☞ B) Valence Electrons
- ☞ C) Similar Chemical properties
- ☞ D) Protons
- ☞ E) Orbitals

# QUESTION 6

- ∞ The following observations were made about 4 mystery elements. Which Element is most likely a Halogen?

ELEMENT W	Has 1 valence electron and is a highly reactive metal
ELEMENT X	Has 3 valence electrons and is a semiconductor
ELEMENT Y	Has 7 valence electrons and is a highly reactive non-metal
ELEMENT Z	Has 8 valence electrons and is a nonreactive non-metal

# QUESTION 7

If I wanted to find an element that is chemically non-reactive, in which group of the periodic table would I look?

- ☞ A. Group 1
- ☞ B. Group 2
- ☞ C. Group 17
- ☞ D. Group 18

# QUESTION 8

Which of the following is likely to be an Alkali Metal?

- ☞ A) A metal good at holding its shape under stress
- ☞ B) An easily-corroded, silvery solid that fizzes in water
- ☞ C) An unreactive colorless gas
- ☞ D) A very toxic and reactive green gas

# QUESTION 9

The Halogen non-metals are all in the same group of the Periodic Table because they all...

- ☞ A) have seven electrons in the outer shell
- ☞ B) react rapidly with hydrogen by sharing one electron
- ☞ C) form covalent compounds with metals
- ☞ D) have the same number of orbitals

# BOHR MODEL

∞ This section will test your knowledge of the atomic structures of atoms.

# QUESTION 10

Four electron arrangements are given below for the first four orbitals. Which represents an Alkali Metal?

A) 2, 8, 8

B) 2, 7

C) 2, 8, 8, 1

D) 2, 5

# QUESTION 11

No two elements have the same amount of...

- ☞ A. Protons
- ☞ B. Neutrons
- ☞ C. Valence Electrons
- ☞ D. Atoms

# QUESTION 12

Which of the following is true about atomic structure?

- ✎ A. The electron cloud takes up the greatest amount of space in an atom.
- ✎ B. The Nucleus makes up most of the mass of the atom, holding the protons and electrons.
- ✎ C. The Neutrons are negatively charged.
- ✎ D. The electrons are the smallest subatomic particle found in the nucleus.

# MATTER

## ∞ LAW OF CONSERVATION OF MASS.

- Matter cannot be created or destroyed, **only changed**.
- The number and kind of atoms in the **reactants** have to be the same number and kind of atoms in the **products** – the only change is how they are **bonded**.

# QUESTION 13

How can we tell when a chemical reaction supports the law of conservation of mass?

- ✎ A. When the compounds in the reactants are the same as the products.
- ✎ B. When the reactants are more than the products.
- ✎ C. When the atoms in the reactants are the same type and amount as the products.
- ✎ D. When we get more products than reactants.

# QUESTION 14

Josh is running an experiment in a closed system. He starts with 300g of substance A and mixes 50g of Substance B. Substance B dissolves into substance A. To finish the experiment he adds in one 5g tablet to the mixture. A gas forms. What is the total ending mass of his experiment?

- A. 350g
- B. 250g
- C. 245g
- D. 355g

# MIXTURES vs. PURE SUBSTANCES

# QUESTION 15

Which of the following is a homogeneous mixture?

- ☞ A. Milk
- ☞ B. A box of Legos
- ☞ C. Sugar
- ☞ D. Cookie dough ice cream

# QUESTION 16

Which of the following is **not** an example of a diatomic molecule?



# QUESTION 17

Which of the following is true about compounds?

- ☞ A. All compounds are molecules
- ☞ B. All molecules are compounds
- ☞ C. All compounds are mixtures
- ☞ D. All mixtures are compounds

# QUESTION 18

The chemical combination of atom A and atom B would result in

- ☞ A. Atom AB
- ☞ B. An element AB
- ☞ C. A compound AB
- ☞ D. A mixture AB

# QUESTION 19

Identify the charge that atoms always have?

- ☞ A. They are always positively charged
- ☞ B. They are always negatively charged
- ☞ C. They are always neutrally charged
- ☞ D. They can be positively charged, negatively charged, or neutrally charged

# QUESTION 20

H<sub>2</sub>, N<sub>2</sub>, and O<sub>2</sub> are all examples of \_\_\_\_\_?

- ☞ A. Diatomic molecules
- ☞ B. Ions
- ☞ C. Mixtures
- ☞ D. Compounds

# QUESTION 21

Identify the difference between elements and compounds.

- ✎ A. Elements contain more than one kind of atom, while compounds contain only one type of atom.
- ✎ B. Elements can only be separated by physical means while compounds cannot.
- ✎ C. Elements contain only one type of atom, while compounds contain more than one type of atom.
- ✎ D. Elements are acids while compounds are always bases.

# BALANCING CHEMICAL EQUATIONS

- ∞ What are the **parts called** and how do we balance them to satisfy the **law of conservation of mass**?

# QUESTION 22



How many Coefficients are found in the equation above?

- A. 4
- B. 2
- C. 0
- D. 6

# QUESTION 23



How many different types of substances are on the reactant side of the equation?

- ⌘ A. 4
- ⌘ B. 2
- ⌘ C. 5
- ⌘ D. 12

# QUESTION 24



Balance the equation...

# QUESTION 25

Why can't we change the subscript when balancing chemical equations?

- ✎ A. It actually doesn't matter.
- ✎ B. It changes the electrons reacting.
- ✎ C. It changes the entire substance.
- ✎ D. Only physical changes will happen then.

# BONUS: 5 points

Explain how you can predict an element's physical and chemical properties from its placement on the periodic table.

# QUESTION 1

- Below is a list of changes, name all the changes that have to do with chemical reactions.

**Bubbling/ Fizzing**

**Creation of light**

Melting

Dissolving

**Changes in temperature on their own**

Color with Dyes

**Formation of a Precipitate**

Breaking

# QUESTION 2

A characteristic of a pure substance is that all pure substances...

- ☞ A. Cannot be separated by physical means. *(Pure substances are put together chemically, and thus must be taken apart chemically.)*
- ☞ B. Can be separated by physical means.
- ☞ C. Can be separated by using filters.
- ☞ D. Cannot be separated chemically.

# QUESTION 3

Evaporation, condensing, vaporizing, solidifying, melting, and freezing are all examples of what?

MORE THAN ONE ANSWER MAY BE CORRECT.

- ☞ A. matter being lost
- ☞ B. physical changes
- ☞ C. chemical properties
- ☞ D. changes in state.
- ☞ *No different matter is produced by these examples, so they are physical changes.*

# QUESTION 4

Which statement is true about the modern periodic table?

- ✎ A) A period is a complete horizontal row of elements of similar chemical character
- ✎ B) Elements behave about the same when the outer shell contains the same number of electrons (*i.e., elements with the same valence electrons – those in the same group – behave similarly.*)
- ✎ C) About 1/4 of the elements are metals
- ✎ D) A group is a vertical column of very different elements

# QUESTION 5

Elements in the same group of family have what in common?

MORE THAN 1 ANSWER MAY BE CORRECT

- ☞ A) Atomic structure
- ☞ B) Valence Electrons
- ☞ C) Similar Chemical properties
- ☞ D) Protons
- ☞ E) Orbitals

# QUESTION 6

- ∞ The following observations were made about 4 mystery elements. Which Element is most likely a Halogen?

ELEMENT W	Has 1 valence electron and is a highly reactive metal
ELEMENT X	Has 3 valence electrons and is a semiconductor
ELEMENT Y	Has 7 valence electrons and is a highly reactive non-metal
ELEMENT Z	Has 8 valence electrons and is a nonreactive non-metal

# QUESTION 7

If I wanted to find an element that is chemically non-reactive, in which group of the periodic table would I look?

- ✎ A. Group 1 (Alkali Metals)
- ✎ B. Group 2 (Alkaline Earth Metals)
- ✎ C. Group 17 (Halogens)
- ✎ D. Group 18 (Noble Gases)

# QUESTION 8

Which of the following is likely to be an Alkali Metal?

- ☞ A) A metal good at holding its shape under stress
- ☞ B) An easily-corroded, silvery solid that fizzes in water (*remember the videos we watched where they produced hydrogen gas, caught on fire and sometimes exploded?*)
- ☞ C) An unreactive colorless gas
- ☞ D) A very toxic and reactive green gas

# QUESTION 9

The Halogen non-metals are all in the same group of the Periodic Table because they all...

- ✎ A) have seven electrons in the outer shell  
*(Halogens are group 7 = 7 valence electrons – remember we don't count the transition metals when counting group numbers.)*
- ✎ B) react rapidly with hydrogen by sharing one electron
- ✎ C) form covalent compounds with metals
- ✎ D) have the same number of orbitals

# QUESTION 10

Four electron arrangements are given below for the first four orbitals. Which represents an Alkali Metal?

☞ A) 2, 8, 8

☞ B) 2, 7

☞ C) 2, 8, 8, 1 (*All Alkali Metals have only 1 valence electron because they are in group 1, so we need to look for the configuration that has 1 electron in the last orbital. This particular configuration belongs to potassium  $\rightarrow 2+8+8+1 = 19$  electrons = 19 protons = Atomic Number 19.*)

☞ D) 2, 5

# QUESTION 11

No two elements have the same amount of...

- ☞ A. Protons (*every element has a different atomic number, and atomic number = # protons ( $p^+$ ). Since changing the # $p^+$  changes the element, two different elements cannot have the same # $p^+$  → Carbon has 6  $p^+$  and Nitrogen has 7 $p^+$ , and if Carbon's  $p^+$  number changed to 7, it would become Nitrogen. When that happens, it's not two elements having the same number of  $p^+$  – it's the same element having the same number of  $p^+$ ).*)
- ☞ B. Neutrons
- ☞ C. Valence Electrons
- ☞ D. Atoms

# QUESTION 12

Which of the following is true about atomic structure?

- ☞ A. The electron cloud takes up the greatest amount of space in an atom.
- ☞ B. The Nucleus makes up most of the mass of the atom, holding the protons and electrons.
- ☞ C. The Neutrons are negatively charged.
- ☞ D. The electrons are the smallest subatomic particle found in the nucleus.

# QUESTION 13

How can we tell when a chemical reaction supports the law of conservation of mass?

- ✎ A. When the compounds in the reactants are the same as the products.
- ✎ B. When the reactants are more than the products.
- ✎ C. When the atoms in the reactants are the same type and amount as in the products. (*This does not mean the substances are the same in the reactants and products, just the number and kind of atoms used to make the substances.*)
- ✎ D. When we get more products than reactants.

# QUESTION 14

Josh is running an experiment in a closed system. He starts with 300g of substance A and mixes 50g of Substance B. Substance B dissolves into substance A. To finish the experiment he adds in one 5g tablet to the mixture. A gas forms. What is the total ending mass of his experiment?

- ✎ A. 350g
- ✎ B. 250g
- ✎ C. 245g
- ✎ D. 355g (*since no matter escaped because it's a closed system*)

# QUESTION 15

Which of the following is a homogeneous mixture?

☞ A. Milk

☞ B. A box of Legos

☞ C. Sugar

☞ D. Cookie dough ice cream

☞ *Homogeneous means evenly spread out.*

# QUESTION 16

Which of the following is **not** an example of a diatomic molecule?

☞ A.  $I_2$

☞ B.  $SO_2$  (*This one has two different kinds of elements, the rest have one kind.*)

☞ C.  $Cl_2$

☞ D.  $H_2$

# QUESTION 17

Which of the following is true about compounds?

- ☞ A. All compounds are molecules
- ☞ B. All molecules are compounds
- ☞ C. All compounds are mixtures
- ☞ D. All mixtures are compounds

# QUESTION 18

The chemical combination of atom A and atom B would result in

- ⌘ A. Atom AB
- ⌘ B. An element AB
- ⌘ C. A compound AB
- ⌘ D. A mixture AB

# QUESTION 19

Identify the charge that atoms always have?

- ✎ A. They are always positively charged
- ✎ B. They are always negatively charged
- ✎ C. They are always neutrally charged
- ✎ D. They can be positively charged, negatively charged, or neutrally charged (*All atoms don't all have the same charge at the same time. If the question specifies atoms that are by themselves – i.e. not bonded – then the answer is C.*)

# QUESTION 20

H<sub>2</sub>, N<sub>2</sub>, and O<sub>2</sub> are all examples of  
\_\_\_\_\_?

- ☞ A. Diatomic molecules (*“Di” means 2, “atomic” means atoms*)
- ☞ B. Ions
- ☞ C. Mixtures
- ☞ D. Compounds

# QUESTION 21

Identify the difference between elements and compounds.

- ✎ A. Elements contain more than one kind of atom, while compounds contain only one type of atom.
- ✎ B. Elements can only be separated by physical means while compounds cannot.
- ✎ C. Elements contain only one type of atom, while compounds contain more than one type of atom.
- ✎ D. Elements are acids while compounds are always bases.

# QUESTION 22



How many Coefficients are found in the equation above?

A. 4

B. 2

C. 0

D. 6

*Another way to word this question is, if you were to draw arrows pointing to the coefficients, how many arrows would you have to draw?*

# QUESTION 23



How many different types of substances are on the reactant side of the equation?

☞ A. 4

☞ B. 2

☞ C. 5

☞ D. 12

☞ *Yield arrow points to the products; reactants are on the other side.*

# QUESTION 24



Balance the equation...

## Reactants

$$\text{C} = 1 \quad (1 \times 1)$$

$$\text{H} = 4 \quad (1 \times 4)$$

$$\text{O} = 4 \quad (2 \times 2)$$

## Products

$$\text{C} = 1 \quad (1 \times 1)$$

$$\text{H} = 4 \quad (2 \times 2)$$

$$\text{O} = 4 \quad (1 \times 2) + (2 \times 1)$$

# QUESTION 25

Why can't we change the subscript when balancing chemical equations?

- ✎ A. It actually doesn't matter.
- ✎ B. It changes the electrons reacting.
- ✎ C. It changes the entire substance. (*And therefore, the written equation would no longer represent what actually happens in the real chemical reaction.*)
- ✎ D. Only physical changes will happen then.

# BONUS: 5 points

Explain how you can predict an element's physical and chemical properties from its placement on the periodic table.

- ∞ Based upon an element's placement on the periodic table, we can predict its properties if we know
  - The areas in which the metals, metalloids, and non-metals are found
  - The areas in which elements are solid, liquid, and gas
  - The period the element is in (and what it tells us about the element, i.e. #orbitals)
  - The family the element is in (and what it tells us about the element, i.e. reactivity, #valence electrons)