

# Matter Quiz A

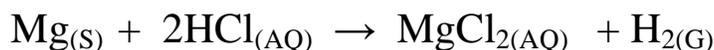
1. Potassium dichromate is written as  $K_2Cr_2O_7$ . How many atoms are in that compound?
2. Aluminum oxalate is  $Al_2(C_2O_4)_3$ . How many atoms in that compound?
3. Chlorophyll (from biology!) is  $C_{55}H_{72}MgN_4O_5$ . How many atoms in that compound?
4. Uranocene (a funny name, and it contains uranium too!) is  $U(C_8H_8)_2$ . How many atoms in that compound?
5. What is the Boiling Point for aluminum in centigrade?
6. What is the Freezing Point for titanium in centigrade?
7. What is the Melting point for silver in centigrade?
8. This is the chemical reaction showing the single replacement reaction where magnesium is reacted into hydrochloric acid. Below are four choices, which of them is correct?



- A. Magnesium is the product and chloride is the spectator ion
  - B. Hydrogen replaces the magnesium in solution, chloride is the spectator ion
  - C. Magnesium is a reactant, the acid is a product
  - D. Magnesium replaces hydrogen in solution, hydrogen is a product
9. During a chemical reaction, the properties of the reactants
    - A. are retained by the products
    - B. are lost as new properties of products are created
    - C. a blend of properties between the reactants form in the new products
    - D. are present along with new properties of the products simultaneously
  10. Using this reaction of the synthesis of magnesium chloride from its elements:  $Mg_{(S)} + Cl_{2(G)} \rightarrow MgCl_{2(S)}$   
To produce 470. grams of this product would require you to react 120. grams of magnesium.  
How many grams of chlorine were consumed at the same time?

## Matter Quiz A answers

1. Potassium dichromate is written as  $K_2Cr_2O_7$ . How many atoms are in that compound? 11
2. Aluminum oxalate is  $Al_2(C_2O_4)_3$ . How many atoms in that compound? 20
3. Chlorophyll (from biology!) is  $C_{55}H_{72}MgN_4O_5$ . How many atoms in that compound? 137
4. Uranocene (a funny name, and it contains uranium too!) is  $U(C_8H_8)_2$ . How many atoms in that compound? 33
5. What is the Boiling Point for aluminum in centigrade?  $K = C + 273$  2792  $K = C + 273$   $C = 2519$  °C
6. What is the Freezing Point for titanium in centigrade?  $K = C + 273$  1941  $K = C + 273$   $C = 1668$  °C
7. What is the Melting point for silver in centigrade?  $K = C + 273$  1235  $K = C + 273$   $C = 1962$  °C
8. This is the chemical reaction showing the single replacement reaction where magnesium is reacted into hydrochloric acid. Below are four choices, which of them is correct?



- A. Magnesium is the product and chloride is the spectator ion (X Mg is a reactant)
  - B. Hydrogen replaces the magnesium in solution, chloride is the spectator ion (X Mg replaces the H)
  - C. Magnesium is a reactant, the acid is a product (X Mg is a reactant, but so is the acid)
  - D. Magnesium replaces hydrogen in solution, hydrogen is a product (TRUE)
9. During a chemical reaction, the properties of the reactants
- B. are lost as new properties of products are created
10. Using this reaction of the synthesis of magnesium chloride from its elements:  $Mg_{(S)} + Cl_{2(G)} \rightarrow MgCl_{2(S)}$   
To produce 470. grams of this product would require you to react 120. grams of magnesium.  
How many grams of chlorine were consumed at the same time?

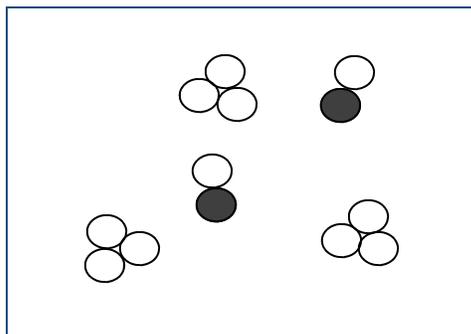
Looks hard, until you realize it is a conservation of matter problem, not a mole problem (also easy but more work)

120. grams magnesium + X grams chlorine = 470 grams magnesium chloride

120 g + 350 grams chlorine = 470 grams  $MgCl_2$ . (matter can't be created or destroyed in a chemical reaction or a physical change).

# Matter Quiz B

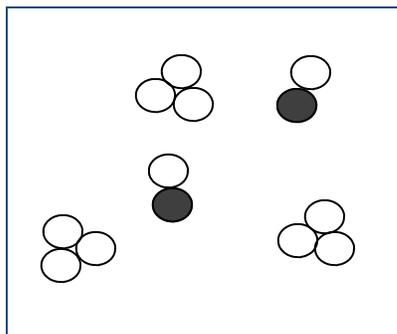
1. State the WHOLE Law of Conservation of Matter
2. List in order the four Halogen atoms, which group are they in?
3. List in order the six Alkaline Earth Metals, which group are they in?
4. List in order the six Noble Gases, which group are they in?
5. Name Group 1, Name groups 3 through 12, Name the atoms in the two “detached” rows at the bottom of the table (and what groups and or periods do they belong in the table itself?).
6. How many protons, neutrons, and electrons are in the most common isotope of tungsten.
7. How many protons, neutrons, and electrons are in the most common isotope of the CATION of strontium?
8. Which of the following statements is true? (one or more than one of these choices may be correct)
  - A. Elements are pure substances, Compounds are not.
  - B. Compounds are pure substances, Elements are pure substances also
  - C. Mixtures are not pure substances, Elements are pure substances
  - D. Mixtures are not pure substances, Compounds are not pure substances either
9. The smallest particles of substances have specific names. One or more than one of these statements is true. Choose ALL of the correct statements:
  - A. The smallest part of the element carbon is a molecule
  - B. The smallest part of the compound sodium chloride is a molecule
  - C. The smallest part of the element iron is an atom
  - D. The smallest part of the substance magnesium oxide is a formula unit
  - E. The smallest part of the element calcium is an atom
  - F. The smallest part of the compound methane is a molecule
  - G. The smallest part of the substance carbon dioxide is a molecule
  - H. The smallest part of the mixture aqueous sodium chloride is a molecule
  - I. The smallest part of the mixture of  $\text{CuSO}_4(\text{AQ})$  is a formula unit
  - J. The smallest part of the element tin is a formula unit
10. Using the particle diagram here, which of these choices best describes this? One or more than one of these choices could be correct. Choose ALL of the correct choices. This picture represents



- A. Two different elements
- B. Two different substances
- C. Two different compounds
- D. Two diatomic molecules and three tri-atomic molecules
- E. Ozone gas ( $\text{O}_3$ ) and Oxygen gas ( $\text{O}_2$ )
- F. Ozone gas ( $\text{O}_3$ ) and Carbon Dioxide gas ( $\text{CO}_2$ )
- G. Carbon Monoxide gas ( $\text{CO}$ ) and Ozone gas ( $\text{O}_3$ )
- H. Elemental Iron ( $\text{Fe}_3$ ) and Molecular Hydrogen Monofluoride gas ( $\text{HF}$ )

# Matter Quiz B answers

1. State the **WHOLE** Law of Conservation of Matter Matter cannot be created or destroyed in a chemical reaction, or a physical change. Many students forget the second part (bad). A physical change is a phase change, solid to liquid for example.
2. List in order the four Halogen atoms, which group are they in? Group 17 includes F, Cl, Br, and I (all are diatomic)
3. List in order the six Alkaline Earth Metals, which group are they in? Group 2 includes Be, Mg, Ca, Sr, Ba, and Ra (none are diatomic)
4. List in order the six Noble Gases, which group are they in? Group 18 includes He, Ne, Ar, Kr, Xe, and Rn. (none are diatomic)
5. Name Group 1, Name groups 3 through 12, Name the atoms in the two “detached” rows at the bottom of the table (and what groups and or periods do they belong in the table itself?)  
Group 1 are the Alkali Metals, 3 through 12 are the Transitional Metals, and the bottom rows are called the Inner Transitional Metals, which are ALL in Group 3, in period 6 and period 7
6. How many protons, neutrons, and electrons are in the most common isotope of tungsten. W-184, has 74 p<sup>+</sup>, 74 e<sup>-</sup>, and 110 n<sup>0</sup>
7. How many p, n, and e are in the most common isotope of the CATION of strontium? Sr-88 has 38 p<sup>+</sup>, 36 e<sup>-</sup>, and 50 n<sup>0</sup>
8. Which of the following statements is true?
  - A. Elements are pure substances, Compounds are not. X (true, false)
  - B. Compounds are pure substances, Elements are pure substances also (true, true)
  - C. Mixtures are not pure substances, Elements are pure substances (true, true)
  - D. Mixtures are not pure substances, Compounds are not pure substances either X (true, false)
9. The smallest particles of substances have specific names. One or more than one of these statements is true. Choose ALL of the correct statements:
  - A. The smallest part of the element carbon is a molecule X It is an ATOM.
  - B. The smallest part of the compound sodium chloride is a molecule X It is a formula unit
  - C. The smallest part of the element iron is an atom TRUE
  - D. The smallest part of the substance magnesium oxide is a formula unit TRUE
  - E. The smallest part of the element calcium is an atom TRUE
  - F. The smallest part of the compound methane is a molecule TRUE
  - G. The smallest part of the substance carbon dioxide is a molecule TRUE
  - H. The smallest part of the mixture aqueous sodium chloride is a molecule X mixtures do not have representative particles.  
This contains molecules of water and dissociated ions. It is not a substance, it is a solution (a homogeneous mixture).
  - I. The smallest part of the mixture of CuSO<sub>4(AQ)</sub> is a formula unit X this is another homogeneous mixture called a solution.  
It has water molecules with loose (dissociated ions) floating in it.
  - J. The smallest part of the element tin is a formula unit X elements are made up of atoms
10. Using the particle diagram here, which of these choices best describes this? One or more than one of these choices could be correct. Choose ALL of the correct choices. This picture represents



- A. Two different elements X
- B. Two different substances TRUE
- C. Two different compounds X One compound, one triple-atom called a triatomic element
- D. Two diatomic molecules and three tri-atomic molecules X diatomic refers ONLY to the HONCIBrIF twins, 2 of the same atoms The smaller molecules here have 2 different atoms
- E. Ozone gas (O<sub>3</sub>) and Oxygen gas (O<sub>2</sub>) X Could be ozone, but not oxygen
- F. Ozone gas (O<sub>3</sub>) and Carbon Dioxide gas (CO<sub>2</sub>) X Could be ozone, but not CO<sub>2</sub>
- G. Carbon Monoxide gas (CO) and Ozone gas (O<sub>3</sub>) TRUE
- H. Elemental Iron (Fe<sub>3</sub>) and Molecular Hydrogen Monofluoride gas (HF). No such thing as Fe<sub>3</sub> (unless it is in some funky formula in a compound) Iron exists as single atoms. Could be HF.

## Matter Quiz C

- For the following 4 descriptions, choose the proper phase they describe
  - Indefinite Shape, Definite Volume
  - Definite Shape, Definite Volume
  - Indefinite Shape, Indefinite Volume
  - Definite Shape, Indefinite Volume
- For the following 4 descriptions, choose the proper phase they describe
  - Particles organized into repeating pattern, does not conform to the container
  - Particles touching but not locked into place, does conform to bottom of the container
  - Some particles organized, some moving rapidly with small space between each one
  - Particles moving rapidly, with much empty space around each one
- To separate mixtures you must take advantage of a difference in their physical properties. Which of these is likely to be successful? (one or more than one answer may be correct)
  - Using a magnet on iron and aluminum metal powders that were mixed together
  - Using paper chromatography to separate a mixture of the liquids water and ethanol (alcohol)
  - Using filter paper on a mixture of liquid water and calcium carbonate ( $\text{CaCO}_3$ )
  - Using distillation to separate solid sulfur and solid iron metal shards
  - Using filter paper to separate iron powder from liquid ethanol (alcohol)
  - Using filter paper on a mixture of liquid water and sodium nitrate ( $\text{NaNO}_3$ )
- Define HOMOGENEOUS, and HETERGENEOUS. Decide which (or both) of these vocabulary words would each of these fit best as an example of: water, methane,  $\text{CO}_2$  gas, table salt, honey, hydrochloric acid, iron (III) oxide, sulfur trioxide, pure oxygen ( $\text{O}_2$ ), metallic indium, metallic strontium, bromine liquid, aluminum oxide,  $\text{MgO}$ , gasoline ( $\text{C}_8\text{H}_{18}$ ), sodium hydroxide ( $\text{NaOH}$ ), aqueous ammonia, and liquid mercury.
- What do the letters TOPIC-B stand for? When are they helpful to remember, besides RIGHT NOW?
- Physical and Chemical changes result in a rearrangement of particles. Which statement best represents a physical change, and which best represents a chemical change? Which are just wrong?
  - New substances form, with no new properties
  - New substances form, with new properties
  - No new substances form, the same properties exist
  - No new substances form, different properties exist
- You put three drops of a clear solution into a watch glass. You add three drops of a yellow colored solution to it. Very small green specks form and drop out of solution. Was this a physical change or a chemical change?
- You melt a large ice cube in your hand. Is this a physical or a chemical change?
- Wax birthday candles are lit for you (Happy Birthday). During the singing part, but before you blow them all out, some wax melts onto your cake icing, but the candles are definitely smaller than before. Where did that wax go?
- How many atoms are in this compound:  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$   
(To be really sharp, name it properly even though naming it is not part of matter. You should be able to do this.)

# Matter Quiz C answers

- For the following 4 descriptions, choose the proper phase they describe
  - Indefinite Shape, Definite Volume **LIQUID**
  - Definite Shape, Definite Volume **SOLID**
  - Indefinite Shape, Indefinite Volume **GAS**
  - Definite Shape, Indefinite Volume **FAKE**
- For the following 4 descriptions, choose the proper phase they describe
  - Particles organized into repeating pattern, does not conform to the container **SOLID**
  - Particles touching but not locked into place, does conform to bottom of the container **LIQUID**
  - Some particles organized, some moving rapidly with small space between each one **FAKE**
  - Particles moving rapidly, with much empty space around each one **GAS**
- To separate mixtures you must take advantage of a difference in their physical properties. Which of these is likely to be successful? (one or more than one answer may be correct)
  - Using a magnet on iron and aluminum metal powders that were mixed together **TRUE**
  - Using paper chromatography to separate a mixture of the liquids water and ethanol (alcohol) **FALSE**, both would flow into paper but both would evaporate away as well.
  - Using filter paper on a mixture of liquid water and calcium carbonate ( $\text{CaCO}_3$ ) **TRUE**  $\text{CaCO}_3$  is NOT soluble in water
  - Using distillation to separate solid sulfur and solid iron metal shards **No**, distillation is to separate liquids apart
  - Using filter paper to separate iron powder from liquid ethanol (alcohol) **TRUE**
  - Using filter paper on a mixture of liquid water and sodium nitrate ( $\text{NaNO}_3$ ) **FALSE**,  $\text{NaNO}_3$  is aqueous, it would get through the filter paper just like the water molecules.

<p><b>4</b></p> <p><b>Homogeneous means the SAME THROUGHOUT,</b></p> <p>includes elements, compounds, and some mixtures (called solutions) Has a specific FORMULA.</p>	<p>Examples include: ALL of these: water, methane, <math>\text{CO}_2</math> gas, table salt, honey, hydrochloric acid, iron (III) oxide, sulfur trioxide, pure oxygen (<math>\text{O}_2</math>), metallic indium, metallic strontium, bromine liquid, aluminum oxide, <math>\text{MgO}</math>, gasoline (<math>\text{C}_8\text{H}_{18}</math>), sodium hydroxide (<math>\text{NaOH}</math>), aqueous ammonia, and liquid mercury</p>
<p><b>Heterogeneous means NOT THE SAME THROUGHOUT,</b></p> <p>includes some mixtures. Does not have A Formula</p>	<p>Examples include: salt and sugar put together, a big can containing different kinds of nails, peanut M&amp;Ms in popcorn (it's the bomb!), beach sand and sulfur, or brass (an alloy of Cu + Ni metals)</p>

- What do the letters TOPIC-B stand for? When are they helpful to remember, besides RIGHT NOW? They remind you of the 6 indicators that a chemical reaction PROBABLY has taken place. Temperature change, Odor change, Precipitate forms, Irreversibility, Color change, and Bubbles of a new gas. They help you think hard and notice that a chemical reaction might have just happened.
- Physical and Chemical changes result in a rearrangement of particles. Which statement best represents a physical change, and which best represents a chemical change? Which are just wrong?
  - New substances form, with no new properties **FAKE**
  - New substances form, with new properties **CHEMICAL**
  - No new substances form, the same properties exist **PHYSICAL**
  - No new substances form, different properties exist **FAKE**
- You put three drops of a clear solution into a watch glass. You add three drops of a yellow colored solution to it. Very small green specks form and drop out of solution. Was this a physical change or a chemical change? **Chemical, called double replacement reaction**
- You melt a large ice cube in your hand. Is this a physical or a chemical change? **Melting is a PHYSICAL CHANGE (phase change)**
- Wax birthday candles are lit for you (Happy Birthday). During the singing part, but before you blow them all out, some wax melts onto your cake icing, but the candles are definitely smaller than before. Where did that wax go? **Chemical reaction combustion happens during the burning of candles, products are  $\text{CO}_2$  and  $\text{H}_2\text{O}$ , both gases, which went into the air. Not gone, just hard to measure.**
- How many atoms are in this compound:  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$  **This ammonium dichromate contains 19 atoms in the formula.**