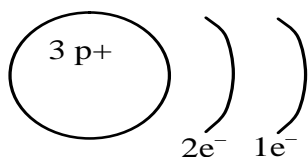


# January Exam Review

## Test 1- Periodic table

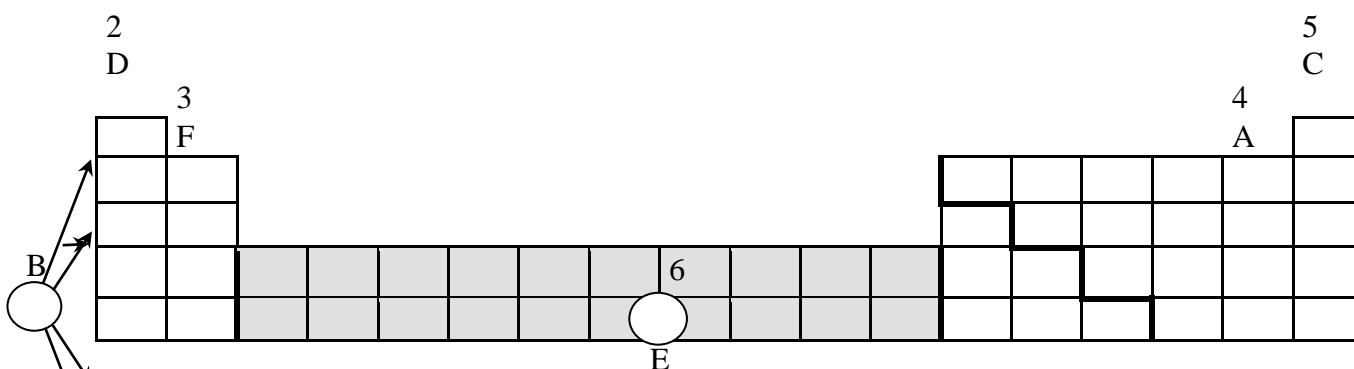
1. Which statement proper explains Rutherford's finding using the gold foil experiment?
- A) The atom was very small with protons in the nucleus and electron on orbits.
  - B) The atom was very small with electrons in the nucleus and protons on orbits.
  - C) The atom was very big with protons in the nucleus and electrons on orbits.
  - D) The atom was very big with protons in the nucleus and electrons outside of the nucleus.**

2. The following diagram represents the simplified atomic model (Bohr-Rutherford) of an element.



Which of the following is true?

- A) The element is located in period 1 and is an alkaline earth metal.
  - B) The element is located in period 1 and is an alkali metal.
  - C) The element is located in period 2 and is an alkali metal.**
  - D) The element is located in period 2 and is an alkaline earth metal.
3. In the diagram below, the circles numbered 1 to 6 represent a characteristic shared by categories of elements in the periodic table.



Each numbered circle is associated with one of the statements below concerning categories of elements. Write the appropriate letter in each of the numbered circles.

- A – The elements in this family have 7 valence electrons.
- B – This space is used to indicate the number of energy levels.
- C – The elements in this family are very chemically stable.
- D – The outermost energy level of these elements contains one electron,  $1e^-$ .
- E – The elements in this category are very malleable and are good conductors of heat and electricity.
- F – One of the elements in this family has 4 protons and 5 electrons.

4. In a laboratory, a scientist noted the following facts about 2 elements:

Element 1 has 3 energy shells and a 5 valence electrons.

Element 2 has 2 full shells

What are elements 1 and 2?

A) Element 1 is potassium and element 2 is neon

**B) Element 1 is phosphorus and element 2 is neon**

C) Element 1 is potassium and element 2 is argon

D) Element 1 is nitrogen and element 2 is argon

5. Five elements are identified in the following periodic table.

I A 1	II A 2	III A 13	IV A 14	V A 15	VI A 16	VII A 17	VIII A 18
						9 F 19.00	10 Ne 20.18
11 Na 22.99				15 P 30.97			
	20 Ca 40.08						

Match each of the five elements with one of the characteristics listed below.

- Its third energy level contains 5 valence electrons.
- It is a gas that does not react with metals or nonmetals.
- It is an element whose chemical reactions are similar to those of potassium.
- It is one of the most corrosive gases.
- It is an alkaline earth metal that is a component of bones and teeth.

**A) 1- P, 2- Ne, 3- Na, 4- F, 5- Ca**      C) 1- P, 2- Ne, 3- F, 4- Na, 5- Ca

B) 1- Ne, 2- F, 3- Na, 4- P, 5- Ca      D) 1- Ca, 2- Ne, 3- F, 4- Na, 5- P

6. Which of the elements in the table below possess the properties of **shininess, electrical conductivity and malleability**?

																			4
1																			3
	2																		

**A) 1 and 2**

B) 1 and 4

C) 2 and 3

D) 3 and 4

7. The illustration represents two elements X and Y:



Write the names of atoms X and Y.

**X= Mg**

**Y= Si**

8. While doing a research project, you noted the following information about five elements.

- Element A :**
- . is a solid;
  - . conducts electricity;
  - . has 2 electrons in its outermost shell;
- Element B :**
- . has a very low density;
  - . does not conduct electricity;
  - . has 7 electrons in its outermost shell;
- Element C :**
- . is found in very small quantities in nature;
  - . does not form compounds with other elements;
  - . is in a gaseous state;
- Element D :**
- . is a poor conductor of heat;
  - . is non-ductile and non-malleable;
  - . conducts electricity.
- Element E :**
- . is ductile and malleable;
  - . is a solid;
  - . is a good conductor of heat and electricity;

Classify the elements above as metals, non-metals or metalloids.

**A and E= Metal**

**D= Metalloid**

**B and C = non-metal**

9. A student is given an unknown solid substance belonging to family II A (family 2). To determine the nature of this substance, he conducts the tests listed in the following table. Give the expected result for each test.

TEST	EXPECTED RESULT
- Reacts with a strong acid	<b>Bubbles</b>
- Electrical conductivity test	<b>Conducts</b>
- Thermal conductivity test	<b>Conducts</b>
- Malleability test	<b>Bends</b>

## **Test 2- Solution, electrolytes and pH**

1. Chlorine is sometimes used in a city's water filtration system to kill micro-organisms. To ensure fish in an aquarium are not affected by the chlorine, tap water could be left sitting for 24 hours to allow the chlorine to evaporate. The lethal dose of chlorine for most

goldfish is 0.05 mg/L. Most water filtration systems use 45.5 ppm to kill micro-organisms. Do you need to let the water sit for 24 hours so the chlorine could evaporate?

$$\frac{0.00005 \text{ g}}{1 \text{ 000 mL}} = \frac{\quad \times \quad}{1 \text{ 000 000}} \quad 0.05 \text{ ppm}$$

**Yes because 45.5 ppm will kill fish since lethal does is 0.05 ppm**

2. You have a 40 g/L solution. You want to make a 300 mL solution. Solve and explain the process of making the solution.

$$\frac{40}{1000} = \frac{x}{300} = 12\text{g}$$

**flask**

- 1- Weigh 12 g of solute**  
**2- Put 12 g in 300 mL volumetric flask**  
**3- Add water and swirl**  
**4- Add water to line**  
**5- Check meniscus**

3. Which of the following categories of substances are considered to be electrolytes?

- A) Acids and neutral salts                      C) **Acids, bases and salts**  
 B) Acids and bases                                D) Salts and bases

4. Associate each substance with the correct characteristic

Substances	Characteristics
1. Aqueous aluminium hydroxide, $\text{Al(OH)}_{3(\text{aq})}$	a) Acid
2. Aqueous calcium hydroxide, $\text{Ca(OH)}_{2(\text{aq})}$	b) Neutral
3. Aqueous acetic acid, $\text{HCH}_3\text{CO}_{2(\text{aq})}$	c) Basic
4. Aqueous lithium hydroxide, $\text{LiOH}_{(\text{aq})}$	
5. Aqueous hydrogen chlorate, $\text{HClO}_{3(\text{aq})}$	
A) 1a, 2a, 3c, 4a and 5c	C) 1c, 2a, 3b, 4c and 5a
B) <b>1c, 2c, 3a, 4c and 5a</b>	D) 1a, 2c, 3b, 4c and 5a

5. In order to classify three unknown solutions as acids, bases or salts, you have been given the following information :

Solution / Information	1	2	3
Electrical conductivity	yes	yes	yes
Reaction of blue litmus paper	turns red	stays blue	stays blue
Reaction of red litmus paper	stays red	stays red	turns blue

On the basis of this information, how do you classify the three solutions?

- A) Solution 1 : acid              Solution 2 : base              Solution 3 : salt

**B) Solution 1 : acid      Solution 2 : salt      Solution 3 : base**

- C) Solution 1 : base      Solution 2 : acid      Solution 3 : salt  
 D) Solution 1 : base      Solution 2 : salt      Solution 3 : acid

6. Which one of the following describes an acidic solution?  
 A) A solution that does not change the colour of blue litmus paper and that conducts electricity  
 B) A solution that does not change the colour of blue litmus paper and that does not conduct electricity

**C) A solution that turns blue litmus paper red and that conducts electricity**

- D) A solution that turns red litmus paper blue and that does not conduct electricity

10. Which of these aqueous solutions contains a neutral salt?

	Solution 1	Solution 2	Solution 3	Solution 4
Effect on litmus paper	Paper turns red	No effect	Paper turns blue	No effect
Electrical conductivity	Yes	Yes	Yes	No

- A) Solution 1      **B) Solution 2**      C) Solution 3      D) Solution 4

11. Which answer shows the correct electrolytic dissociation for  $\text{CaCl}_2$ ?

- A)  $\text{CaCl}_2 \rightarrow \text{Ca}^{2+} + 2\text{Cl}^-$       C)  $\text{CaCl}_2 \rightarrow \text{Ca} + 2\text{Cl}$   
 B)  $\text{CaCl}_2 \rightarrow 2\text{Ca} + 2\text{Cl}$       D)  $\text{CaCl}_2 \rightarrow 2\text{Ca} + 2\text{Cl}$

12. The following table gives the colours of the indicator phenol red in solutions whose pH values vary from 0 to 14.

pH	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14													
Colour	Yellow						Orange		Red					

A few drops of this indicator are added to a basic solution.  
 What colour does the phenol red become?

- A) **Orange or red**      C) Yellow or orange  
 B) Yellow only      D) Red only

13.

<b>pH Scale</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>Indicator 1</b>	Yellow				Green			Blue			
<b>Indicator 2</b>	Colourless							Pink		Fuchsia	
<b>Indicator 3</b>	Red	Orange			Yellow						
<b>Indicator 4</b>	Red				Orange			Yellow		Green	

The pH of a given solution is unknown. Indicators 1 and 3 turn yellow in this solution. What colour will indicator 4 become in this solution?

- A) Red                      **B) Orange**                      C) Yellow                      D) Green

14. The following table gives the colours of the indicators phenolphthalein and methyl red in solutions that have pH values ranging from 1 to 14.

<b>Phenolphthalein</b>	Colourless							Pink		Red				
<b>pH</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Methyl Red</b>	Red				Orange		Yellow							

A mixture of these two indicators is added to a neutral solution. What colour will the mixture of the two indicators be in this neutral solution?

- A) Colourless                      **B) Yellow**                      C) Orange                      D) Pink

15. This table gives the behaviour of certain indicators.

<b>pH Scale</b>											
<b>Indicator 1</b>	Yellow				Green			Blue			
<b>Indicator 2</b>	Colourless							Pink		Fuchsia	
<b>Indicator 3</b>	Red		Orange		Yellow						
<b>Indicator 4</b>	Red			Orange			Yellow				

The pH of a given solution is unknown. Indicators 1 and 3 turn yellow in this solution. Between which values will the pH of this solution fall?

- A) Between 0 and 5                      C) Between 5 and 12  
 B) **Between 5 and 6**                      D) Between 6 and 12

16. Answer the questions below using the 3 indicators

<b>pH</b>	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>A</b>	Red			Orange				Yellow					
<b>B</b>	Blue		Green		Yellow								
<b>C</b>	Red				Purple				Blue				

- A) Which indicator would you use to find a strong acid?                      **B**  
 B) What is an unknown's pH if it turns orange with A and green with B?                      **4**  
 C) What is an unknown's pH if it turns yellow with A and purple with C?                      **8**

## Test 3- Changes in matter, balancing equations, neutralization and combustion

1. A student performed four tests and made the following observations.

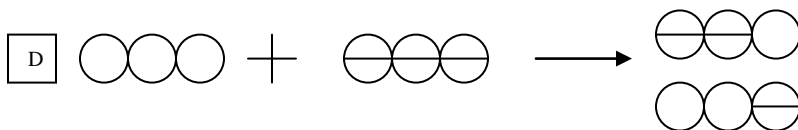
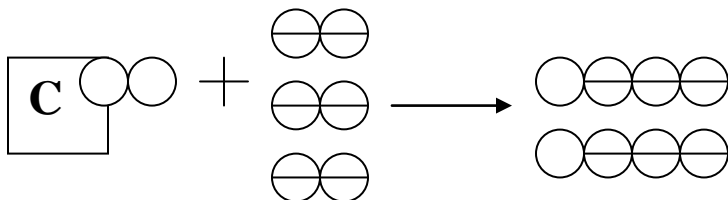
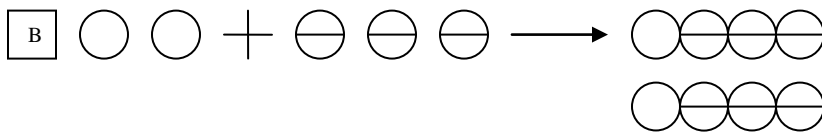
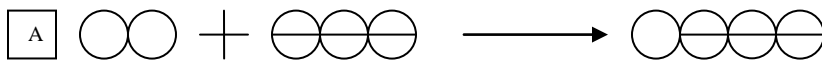
Test	Observation
1. Brought a magnet close to a piece of metal.	The two objects attracted each other.
2. Added lime water to a test tube containing a gas.	The lime water became cloudy.
3. Mixed two colourless liquids in a beaker.	The beaker became warmer.
4. Ground a piece of chalk.	The chalk turned to a very fine white powder.

Which of these tests produced chemical changes?

- A) 1 and 2                      B) 1 and 4                      **C) 2 and 3**                      D) 3 and 4
2. Which of the following equations is correctly balanced?  
 A)  $\text{H}_2\text{SO}_4 + 2 \text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$   
 B)  $2 \text{K}_2\text{O}_2 + 2 \text{H}_2\text{O} \rightarrow 4 \text{KOH} + 2 \text{O}_2$   
**C)  $2 \text{C}_2\text{H}_2 + 5 \text{O}_2 \rightarrow 4 \text{CO}_2 + 2 \text{H}_2\text{O}$**   
 D)  $3 \text{NO}_2 + 2 \text{H}_2\text{O} \rightarrow 4 \text{HNO}_3 + \text{NO}$
3. Richard complained about a thin black film that formed on his aluminum windows. Kim told him that this film was the result of oxidation (rusting) of the aluminum by oxygen in the air. Which balanced equation represents this reaction?  
 A)  $2 \text{Al} + \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$                       C)  $2 \text{Al} + 3 \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$   
**B)  $4 \text{Al} + 3 \text{O}_2 \rightarrow 2 \text{Al}_2\text{O}_3$**                       D)  $4 \text{Al} + 2 \text{O}_2 \rightarrow 2 \text{Al}_2\text{O}_3$
4. One liter of nitrogen ( $\text{N}_2$ ) reacts with three liters of hydrogen ( $\text{H}_2$ ), to produce two liters of ammonia, according to the following equation :



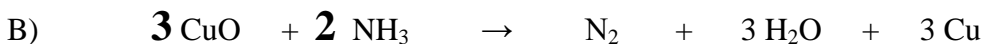
Which of the following models best describes the chemical change that occurs?



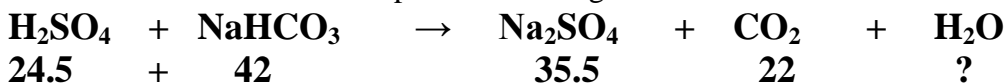
5. The neutralization of hydrochloric acid (HCl) by calcium carbonate (CaCO<sub>3</sub>) produces calcium chloride (CaCl<sub>2</sub>), carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O).

**Write the balanced equation for this neutralization reaction.**

6. Balance the following equations.



7. The neutralization of 24.5 g of sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) requires 42 g of sodium bicarbonate (NaHCO<sub>3</sub>). This neutralization reaction produces 35.5 g of sodium sulphate (Na<sub>2</sub>SO<sub>4</sub>), 22 g of carbon dioxide (CO<sub>2</sub>) and a certain amount of water (H<sub>2</sub>O). What is the mass of the water produced during this neutralization reaction?

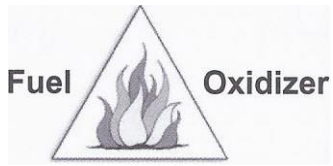


$$66.5 - 35.5 - 22 = 9 \text{ g}$$



8. Each of the three statements listed below can be matched with the fire triangle component.

FIRE TRIANGLE



**Ignition temperature**

Statement 1- One way of fighting forest fires is to remove all the vegetation from certain areas.

Statement 2- Most laboratories have a blanket that can be wrapped around a person whose clothes catch fire.

Statement 3- Buildings adjacent to the one on fire can be sprayed with water to prevent a fire from spreading in a city.

Which of the following choices shows the correct match between the three statements above and the fire triangle components?

	Statement 1	Statement 2	Statement 3
<b>A</b>	<b>Fuel</b>	<b>Oxidizer</b>	<b>Ignition temperature</b>
B	Ignition temperature	Fuel	Oxidizer
C	Fuel	Ignition temperature	Oxidizer
D	Oxidizer	Ignition temperature	Fuel