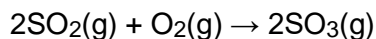


## Chemistry High Level (test for 45 min)

Please read carefully all tasks. All tasks are in English, but they are composed considering the 9<sup>th</sup> grade program. Choose the only one correct answer in each task and fill in the final table.

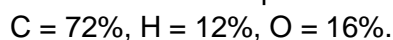
1. 3.0 dm<sup>3</sup> of sulfur dioxide is reacted with 2.0 dm<sup>3</sup> of oxygen according to the equation below.



What volume of sulfur trioxide (in dm<sup>3</sup>) is formed? (Assume the reaction goes to completion and all gases are measured at the same temperature and pressure.)

- A. 5.0                      B. 4.0                      C. 3.0                      D. 2.0

2. The percentage by mass of the elements in a compound is



What is the mole ratio of C:H in the empirical formula of this compound?

- A. 1 : 1                      B. 1 : 2                      C. 1 : 6                      D. 6 : 1

3. Calcium carbonate decomposes on heating as shown below.



When 50 g of calcium carbonate is decomposed, 7 g of calcium oxide is formed. What is the percentage yield of calcium oxide?

- A. 7%                      B. 25%                      C. 50%                      D. 75%

4. Consider the composition of the species. Which species is an anion?

Answer	Number of protons	Number of neutrons	Number of electrons
A.	9	10	10
B.	11	12	11
C.	12	12	12
D.	13	14	10

5. What is the correct number of each particle in a fluoride ion,  $^{19}\text{F}^-$ ?

Answer	protons	neutrons	electrons
A.	9	10	8
B.	9	10	9
C.	9	10	10
D.	9	19	10

6. When the following  $1.0 \text{ mol dm}^{-3}$  solutions are listed in increasing order of pH (lowest first), what is the correct order?

A.  $\text{HNO}_3 < \text{H}_2\text{CO}_3 < \text{NH}_3 < \text{Ba}(\text{OH})_2$

B.  $\text{NH}_3 < \text{Ba}(\text{OH})_2 < \text{H}_2\text{CO}_3 < \text{HNO}_3$

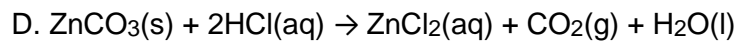
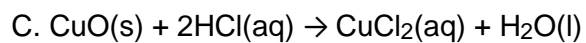
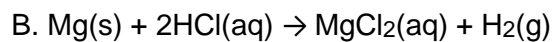
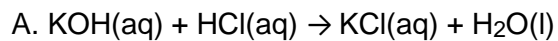
C.  $\text{Ba}(\text{OH})_2 < \text{H}_2\text{CO}_3 < \text{NH}_3 < \text{HNO}_3$

D.  $\text{HNO}_3 < \text{H}_2\text{CO}_3 < \text{Ba}(\text{OH})_2 < \text{NH}_3$

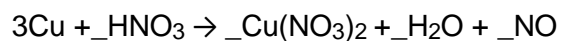
7. What are the oxidation numbers of the elements in sulfuric acid,  $\text{H}_2\text{SO}_4$ ?

Answer	o.n. Hydrogen	o.n. Sulfur	o.n. Oxygen
A.	+1	+6	-2
B.	+1	+4	-2
C.	+1	+1	+4
D.	+1	+6	-8

8. Which equation represents a redox reaction?



9. Copper can react with nitric acid as follows.



What is the coefficient for  $\text{HNO}_3$  when the equation is balanced?

A. 4

B. 6

C. 8

D. 10

**Final answers**

1	2	3	4	5	6	7	8	9