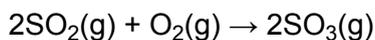


## Chemistry High Level (test for 45 min)

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  
C = 72%, H = 12%, O = 16%.

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%

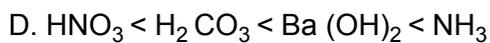
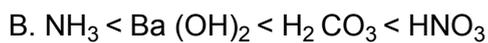
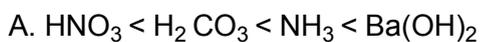
4. Consider the composition of the ions. Which species is an anion?

| 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,  $^{19}\text{F}^-$ ?

|    | 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?



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

|    | 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          |

