

## Sample Test for University Exams Chemistry

1. A sample of  $N_2$  gas occupies 4.48 L volume under standard conditions. What is the mass of the sample? The atomic mass of N is 14 amu.

A: 5.6 g  
B: 56 g  
C: 2.8 g  
D: 28 g  
E: 22.4 g

2. Which properties are characteristic for the nonmetals?

1) high electrical conductivity  
2) large ionization energy  
3) high electronegativity  
4) low electronaffinity

A: 1,2      B: 2,3      C: 3,4      D: 2,4      E: 1,2,3

3. Concerning  $1.2 \times 10^{24}$   $CO_2$  molecules, which statements are true?

1) it is 12 moles.  
2) it occupies  $1.2 \times 22.4$  L volume under standard conditions.  
3) it has a mass of 88 grams.  
4) it consists of  $3.6 \times 10^{24}$  atoms.

A: 1,3      B: 1,4      C: 2,3      D: 2,4      E: 3,4

4. Which of the following molecules contain covalent bonds only?

1)  $BaCl_2$   
2)  $CCl_4$   
3)  $HCl$   
4)  $NH_4$

A: 1,2,3,4      B: 1,2,4      C: 2,3      D: 1,3      E: 2,3,4

5. Which of the following atoms are isotopes?

- 1) **X**: 11 protons, 11 electrons, 12 neutrons
- 2) **Y**: 11 protons, 10 electrons, 12 neutrons
- 3) **V**: 11 protons, 11 electrons, 13 neutrons
- 4) **W**: 12 protons, 12 electrons, 12 neutrons

A: **X** and **Y**      B: **X** and **W**      C: **Y** and **V**      D: **V** and **W**      E: **X** and **V**

6. An aqueous solution is prepared by dissolving 1.6 g NaOH in 250 mL final volume. What is the molar concentration of the solution?  
The molar mass of NaOH is 40 g/mol.

- A: 6.4 mol/L
- B: 1.6 mol/L
- C: 16 mol/L
- D: 0.16 mol/L
- E: 64 mol/L

7. 
$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$$

The reaction is exothermic towards product formation. Which of the following changes of conditions will shift the equilibrium of the reaction to the right?

- 1) increase the pressure.
- 2) increase the concentration of  $\text{NH}_3$ .
- 3) increase the concentration of  $\text{H}_2$  gas.
- 4) decreasing the temperature.

A: 1,3,4      B: 2,3      C: 2,4      D: 2,3,4      E: 1,2,3,4

8. When two elements **X** (atomic number 13) and **Y** (atomic number 8) react the compound formed will be:

- A:  $\text{XY}$
- B:  $\text{X}_3\text{Y}_2$
- C:  $\text{XY}_2$
- D:  $\text{X}_2\text{Y}$
- E:  $\text{X}_2\text{Y}_3$

9. Which is the most basic solution?

- A:  $\text{pH}=11$
- B:  $\text{pOH}=12$
- C:  $\text{pOH}=2$
- D:  $[\text{OH}^-]=10^{-4} \text{ mol/L}$

$$E: [H^+] = 10^{-4} \text{ mol/L}$$

10. Which of the following solutions contains the largest amount of dissolved glucose?

- A: 0.25 L of 5 M solution
- B: 0.5 L of 2 M solution
- C: 50 mL of 0.2 M solution
- D: 500 mL of 1 M solution
- E: 1000 mL of 0.5 M solution

11. In any reaction where a calcium atom changes to calcium ion, the calcium atom

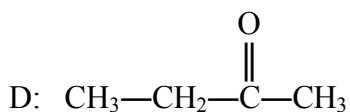
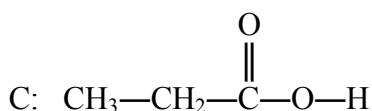
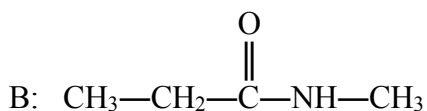
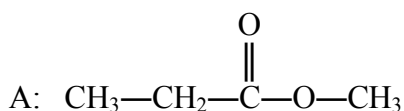
- 1) has lost an electron.
- 2) has become an anion.
- 3) has been oxidized.
- 4) has achieved noble gas electron configuration.

A: 1,2      B: 2,3      C: 3,4      D: 2,4      E: 2,3,4

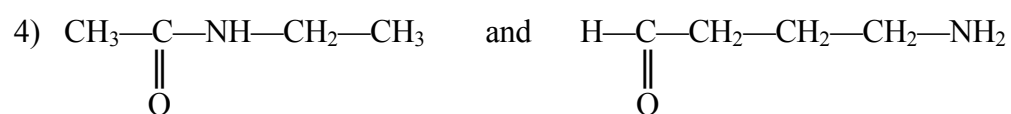
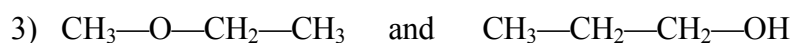
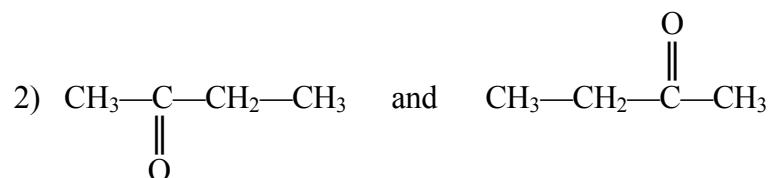
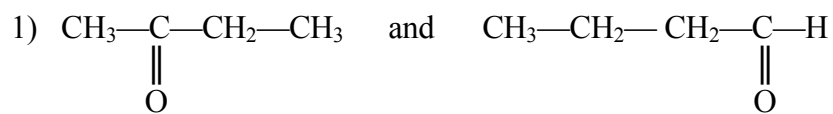
12. What is the oxidation number of *Cr* in  $K_2Cr_2O_7$

- A: -6
- B: +6
- C: +12
- D: -12
- E: +2

13. Choose the compound with an ester group.



14. The members of which pairs are structural isomers?



A: 1,2

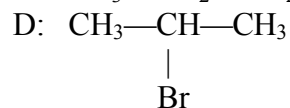
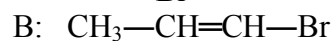
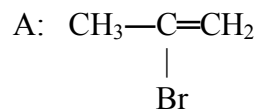
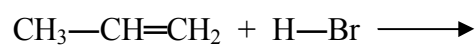
B: 2,3

C: 1,3,4

D: 2,3,4

E: 1,2,3,4

15. The main organic product in the following reaction is:



E: there will be no reaction

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Biology Chemistry Test