

Question for O C :

1. How many structural isomers of heptane exist?

A) 2

B) 4

C) 6

D) 8

E) 9

2. What is the name of the compound below?

A) 2,4-methylbutene

B) 2,5-dimethylpentane

C) 2,4-ethylbutene

D) 2,4-dimethyl-1-pentene

E) 2,4-dimethyl-4-pentene

3. The addition of HBr to cis-2-butene produces

A) 1-bromobutane

B) 2-bromobutane

C) 1,2-dibromobutane

D) 2,3-dibromobutane

E) no reaction

4. The compound below is a(n)

A) carboxylic acid

B) ketone

C) aldehyde

D) ester

E) amine

6. How many isomers of $C_2H_2Cl_2$ are polar?

A) none

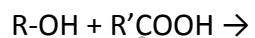
B) 1

C) 2

D) 3

E) It is impossible to tell without more information.

7. The following reaction would produce a(n)?



A) ketone

B) ether

C) aldehyde

D) alcohol

E) ester

8. Which of the following compounds do not contain an sp^3 hybridized oxygen atom?

A) ketones

B) alcohols

C) ethers

D) esters

E) water

9. A sample of gas initially at 4.00 atm was compressed from 8.00 L to 2.00 L at constant temperature. After the compression, the gas pressure was

A) 4.00 atm

B) 2.00 atm

C) 1.00 atm

D) 8.00 atm

E) 16.0 atm

10. A gas originally at 27 °C and 1.00 atm pressure in a 3.9 L flask is cooled at constant pressure until the temperature is 11 °C. The new volume of the gas is

A) 0.27 L

B) 3.7 L

C) 3.9 L $3.9/300 \times 284$

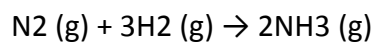
D) 4.1 L

E) 0.24 L

11. A sample of an ideal gas in a closed container at 25.0 °C and 76.0 torr is heated to 300 °C. The pressure of the gas at this temperature is

- A) 912 torr
- B) 146 torr
- C) 76.5 torr
- D) 39.5 torr
- E) 2.53×10^{-2} torr

12. The reaction of 50 mL of N₂ gas with excess H₂ gas forms ammonia via the equation:



What volume of ammonia will be produced if pressure and temperature are kept constant?

- A) 250 mL
- B) 50 mL
- C) 200 mL
- D) 150 mL
- E) 100 mL

13. The density of ammonia gas in a 4.32 L container at 837 torr and 45.0 °C is

- A) 3.86 g/L

- B) 0.719 g/L
- C) 0.432 g/L
- D) 0.194 g/L
- E) 4.22×10^{-2} g/L

14. What volume of hydrogen gas at 38.0 °C and 1 atm can be produced by the reaction of 4.33 g of zinc with excess sulfuric acid?

- A) 1.69 L
- B) 2.71×10^{-4} L
- C) 3.69×10^4 L
- D) 2.84 L
- E) 0.592 L

15. Automobile air bags use the decomposition of sodium azide as their source of gas for rapid inflation:



What mass of NaN₃ is required to provide 40.0 L of N₂ at 25.0 °C and 1 atm?

- A) 1.64 g
- B) 1.09 g
- C) 160 g
- D) 70.8 g

E) 107 g

16. What is the pressure in a 12.2 L vessel that contains 2.34 g of carbon dioxide, 1.73 g of sulfur dioxide, and 3.33 g of argon, all at 42 °C?

A) 263 mmHg

B) 134 mmHg

C) 395 mmHg

D) 116 mmHg

E) 0.347 mmHg

17. The rate of effusion of O₂ is 1.174 times faster than that of a linear alkane. How many carbon atoms does each molecule of the alkane contain?

A) 1

B) 2

C) 3

D) 4

E) 5

18. Which of the following gases will have the largest average molecular speed?

A) H₂ at 300 K

B) H₂ at 1000 K

C) O₂ at 300 K

D) O₂ at 1000 K

E) they are all the same

19. An ideal gas differs from a real gas in that the molecules of an ideal gas

A) have no attraction for one another

B) have appreciable molecular volumes

C) have a molecular weight of zero

D) have no kinetic energy

E) have an average molecular mass

20. Arrange the following gases in order of increasing average molecular speed at 25

°C.

2 Cl₂, 2 O₂, 2 F₂, 2 N₂

A) Cl₂ < F₂ < O₂ < N₂

B) 2 Cl₂ < 2 O₂ < 2 F₂ < 2 N₂

C) 2 N₂ < 2 F₂ < 2 Cl₂ < 2 O₂

D) 2 Cl₂ < 2 F₂ < 2 N₂ < 2 O₂

E) 2 F₂ < 2 O₂ < 2 N₂ < 2 Cl₂

21. Which of the following substances has London dispersion forces as its only

intermolecular force?

A) CH₃ OH

B) NH₃

C) H₂S

D) CH₄

E) HCl

22. Which one of the following should have the lowest boiling point?

A) PH₃

B) H₂S

C) HCl

D) SiH₄

E) H₂O

23. In liquids, the attractive intermolecular forces are

A) very weak compared with kinetic energies of the molecules

B) strong enough to hold molecules relatively close together

C) strong enough to keep the molecules confined to vibrating about their fixed lattice points

D) not strong enough to keep molecules from moving past each other

E) strong enough to hold molecules relatively close together but not strong enough to keep molecules from moving past each other

24. Which one of the following exhibits dipole-dipole attraction between molecules?

A) XeF₄

B) AsH₃

C) CO₂

D) BCl₃

E) Cl₂

25. In general, the vapor pressure of a substance increases as the

A) surface tension increases

B) molecular weight increases

C) hydrogen bonding increases

D) viscosity increases

E) temperature increases

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