London Dispersion Forces

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

A temporary shift in electron density can induce a dipole in a nearby particle. The resulting attraction is called a London dispersion force.

1 Which change in one atom can induce a dipole in a nearby neutral atom?

(1) A change in its number of protons

(2) A temporary uneven distribution of its electrons

(3) A loss of neutrons from its nucleus

(4) A permanent increase in its nuclear charge

2 Which pair can experience London dispersion forces?

(1) Two neon atoms only

(2) Two nitrogen molecules only

(3) Both two neon atoms and two nitrogen molecules

(4) Neither two neon atoms nor two nitrogen molecules

3 A xenon atom has a larger, more easily distorted electron cloud than a neon atom. Explain how this affects the relative strength of attractions in pure xenon and pure neon. [1]

Answer and work

_____

_____

4 Nitrogen boils when its molecules move apart. Explain whether the N≡N bonds within the molecules must break. [1]

Answer and work

_____

_____

Boiling Points of Noble Gases

Use the information below to answer the questions.

A laboratory compares the rounded normal boiling points of three noble gases. In this series, atoms with more electrons have more easily distorted electron clouds and stronger dispersion attractions.

Element	Electrons per atom	Boiling point (°C)
Ne	10	−246
Ar	18	−186
Kr	36	−153

5 Which sample has the highest normal boiling point?

(1) Ne

(2) Ar

(3) Kr

(4) All three have the same boiling point.

6 Use a pair of rows to support the claim that stronger attractions are associated with a higher boiling point in this series. [1]

Answer and work

7 How many degrees Celsius higher is the normal boiling point of argon than that of neon? Show your calculation. [1]

Answer and work

8 Xenon has more electrons per atom than krypton and a more easily distorted cloud. Based on the trend, which is the best prediction for xenon’s normal boiling point?

(1) Below −246 °C

(2) Between −246 °C and −186 °C

(3) Between −186 °C and −153 °C

(4) Above −153 °C