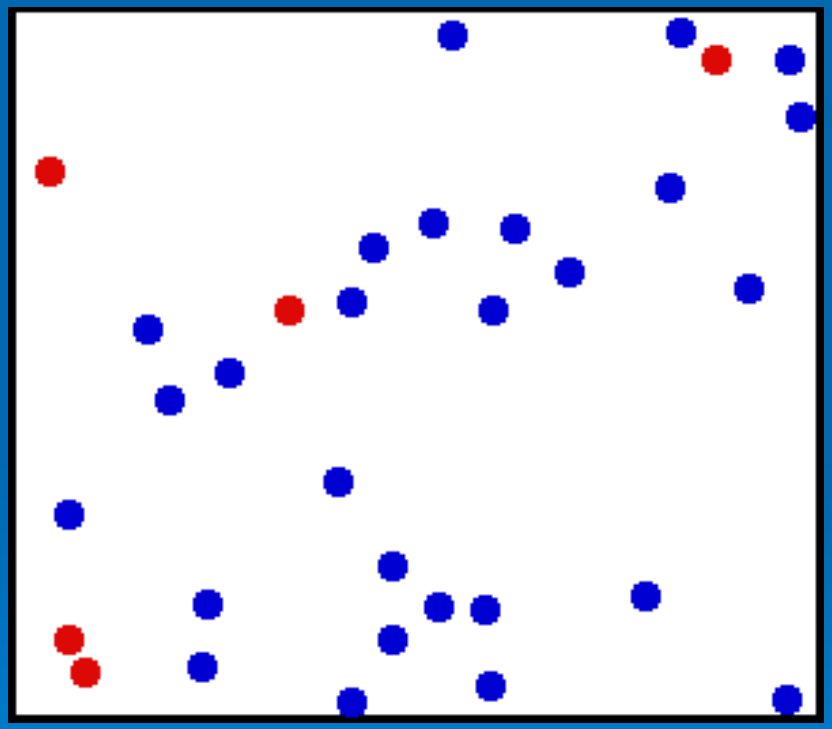
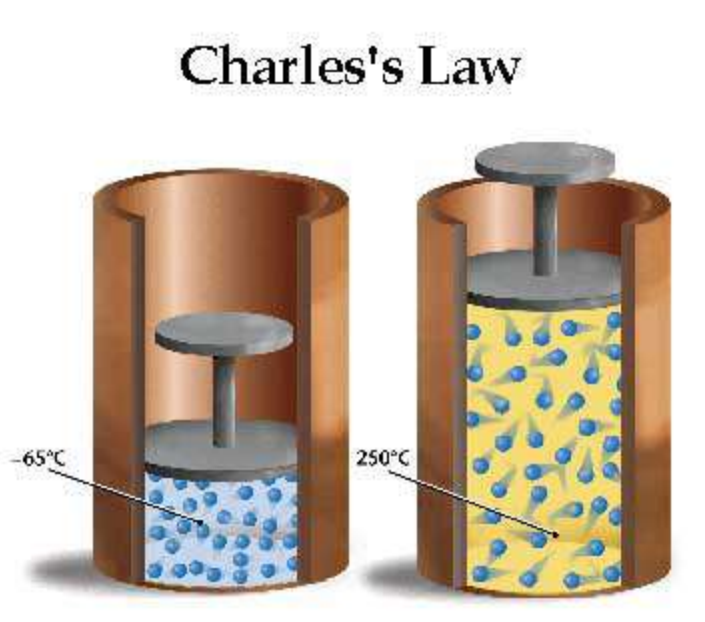
AP Chemistry
Chapter 10 and 11 Jeopardy



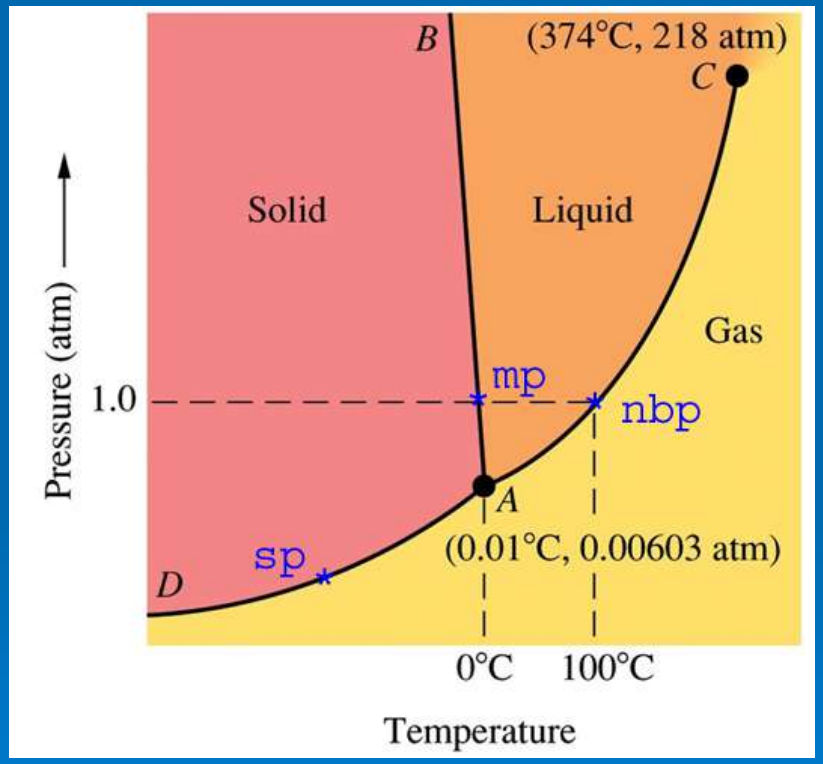
Jennie L. Borders

Round 1 – Chapter 10



Gas Laws	Ideal Gas Law	Molar Mass	Effusion/ Diffusion	Partial Pressures	Kinetic Molecular Theory
100	100	100	100	100	100
200	200	200	200	200	200
300	300	300	300	300	300
400	400	400	400	400	400
500	500	500	500	500	500

Round 2 – Chapter 11



Click to go to Round 2

Gas Laws 100

A sample of a gas (5.0mol) at 1.0 atm is expanded at constant temperature from 10L to 15L. What is the final pressure in atm?

0.67 atm

Gas Laws 200

A balloon originally had a volume of 4.39L at 44°C and a pressure of 729 torr. The balloon must be cooled to what Celsius temperature in order to reduce its volume to 3.78L (at constant pressure).

-0.05°C

Gas Laws 300

A sample of He gas (2.35 mol) occupies 57.9L at 300K and 1 atm. What is the volume of this sample at 423K and 1 atm?

81.64L

Gas Laws 400

A sample of an ideal gas (3L) in a closed container at 25°C and 76 torr is heated to 300°C. What is the pressure in torr now?

146.13 torr

Gas Laws 500

A closed-end manometer was attached to a vessel containing argon. The difference in the mercury levels in the two arms of the manometer was 12.2cm. Atmospheric pressure was 783mm Hg. What is the pressure of argon in the container in mm Hg?

122mm Hg

Ideal Gas Law 100

What is the pressure in kPa exerted by 1.3 mol of gas in a 13L flask at 22°C?

245.15 kPa

Ideal Gas Law 200

How many moles of gas are contained in a 0.325L flask at 0.914 atm and 19^{o}C?

0.012 mol

Ideal Gas Law 300

The density of ammonia gas in a 4.32L container at 837 torr and 45°C is ___ g/L.

0.714 g/L

Ideal Gas Law 400

A sample of gas (1.9 mol) is in a flask at 21°C and 697 mm Hg. The flask is opened and more gas is added to the flask. The new pressure is 795 mm Hg and the temperature is now 26°C. How many moles of gas are left in the flask?

2.13 mol

Ideal Gas Law 500

What volume in mL of sulfur dioxide can be produced by the complete reaction of 3.82g of calcium sulfite with excess HCl, when the final pressure is 827 torr at 44°C?

760 mL SO_2

Molar Mass 100

What is the molar mass of 3.5g of a gas that occupies 2.1L at STP?

37.23 g/mol

Molar Mass 200

What is the molar mass of a gas that has a density of 6.7 g/L at STP?

150.08 g/mol

Molar Mass 300

What is the molar mass of a gas that has a density of 7.10 g/L at 25°C and 1 atm?

173.74 g/mol

Molar Mass 400

What is the molar mass of a gas that has a density of 5.75 g/L at STP?

128.86 g/mol

Molar Mass 500

What is the molar mass of air at STP if it has a density of 1.285 g/L?

28.78 g/mol

Effusion/Diffusion 100

At 333K, which of the following pairs of gases would have the most nearly identical rates of effusion?

a. N_2O and NO_2

b. CO and N_2

c. N_2 and O_2

d. CO and CO_2

e. NO_2 and N_2O_4

Effusion/Diffusion 200

Of the following gases, which one would have the greatest rate of effusion at a given temperature?

a. NH_3

b. CH_4

c. Ar

d. HBr

e. HCl

Effusion/Diffusion 300

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

He, O_2, CO_2, N_2

CO_2, O_2, N_2, He

Effusion/Diffusion 400

A tank containing both HF and HBr gases developed a leak. The ratio of the rate of effusion of HF to HBr is ____.

2

Effusion/Diffusion 500

A sample of oxygen gas was found to effuse at a rate equal to three times that of an unknown gas. What is the molar mass of the unknown gas?

288 g/mol

Partial Pressures 100

A gas mixture of Ne and Ar has a total pressure of 4.00 atm and contains 16 mol of gas. If the partial pressure of N2 is 2.75 atm, how many moles of Ar are in the mixture?

4.96 mol Ar

Partial Pressures 200

A mixture of He and Ne at a total pressure of 0.95 atm is found to contain 0.32 mol of He and 0.56 mol of Ne. What is the partial pressure of Ne in atm?

0.61 atm

Partial Pressures 300

In a gas mixture of He, Ne, and Ar with a total pressure of 8.40 atm, the mole fraction of Ar is ____ if the partial pressures of He and Ne are 1.50 and 2.00 atm, respectively.

0.58

Partial Pressures 400

A sample of NaH weighing __g will produce 982mL of gas at 28°C and 765 torr, when the hydrogen is collected over water. The vapor pressure of water at this temperature is 28 torr.

$NaH + H_2O \rightarrow NaOH + H_2$

0.936g NaH

Partial Pressures 500

In an experiment, 225mL of wet H_2 is collected over water at 27°C and a barometric pressure of 748 torr. How many grams of Zn have been consumed? The vapor pressure of water at 27°C is 26.74 torr.

$$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$$

0.57g Zn

Kinetic Molecular Theory 100

Which of the following is NOT part of the kinetic-molecular theory?

a. Atoms are neither created nor destroyed by ordinary chemical reactions.

b. Attractive and repulsive forces between gas molecules are negligible.

c. Gases consist of molecules in continuous, random motion.

d. Collisions between gas molecules do not result in the loss of energy.

e. The volume occupied by all of the gas molecules in a container is negligible compared to the volume of the container.

Kinetic Molecular Theory 200

An ideal gas differs from a real gas in that the molecules of an ideal gas have no _____ and no _____.

volume, attractions

Kinetic Molecular Theory 300

A real gas will behave most like an ideal gas under condition of _____.

high temperature and low pressure

Kinetic Molecular Theory 400

The kinetic molecular theory predicts that pressure rises as the temperature of a gas increases because _____.

As temperature rises, kinetic energy rises resulting in more collisions with the wall of the container and harder collisions with the wall.

Kinetic Molecular Theory 500

According to the kinetic-molecular theory, if the temperature of a gas is raised from 100°C to 200°C, the average kinetic energy of the gas will _____.

Increase by a factor of 1.27

Vocabulary	Intermolecular Forces	Boiling Point	Heating Curve	Phase Diagram	Solids
200	200	200	200	200	200
400	400	400	400	400	400
600	600	600	600	600	600
800	800	800	800	800	800
1000	1000	1000	1000	1000	1000

Vocabulary 200

What is equilibrium?

When two opposite processes are occurring at the same rate.

Vocabulary 400

What is viscosity?

The resistance of a liquid to flow.

Vocabulary 600

What is surface tension?

The amount of energy needed to increase the surface area.

Vocabulary 800

What is capillary action? What types of forces encourage and discourage capillary action?

Capillary action is the process of a liquid “climbing” up a narrow tube. Adhesive forces encourage capillary action and cohesive forces discourage capillary action.

Vocabulary 1000

What is critical temperature and critical pressure?

Critical temperature is the highest temperature at which pressure can still convert a gas into a liquid. Critical pressure is the pressure needed to convert a gas to a liquid at critical temperature

Intermolecular Forces 200

Of the following substance, which experiences ONLY London dispersion forces?

CH_3OH, NH_3, H_2S, CH_4, HCl

CH_4

Intermolecular Forces 400

What intermolecular forces are present when NaCl dissolves in H_2O?

Ion-dipole forces between ions and water. Hydrogen bonding and dipole attractions between water molecules. Dipersion forces between all molecules.

Intermolecular Forces 600

What intermolecular forces are present in $C_{12}H_{26}$ molecules?

London Dispersion Forces

Intermolecular Forces 800

Which one of the following exhibits dipole-dipole attractions?

XeF_4, AsH_3, CO_2, BCl_3, Cl_2

AsH_3

Intermolecular Forces 1000

In which of the following molecules is hydrogen bonding likely the most significant component of the total intermolecular forces?

CH_4, $C_5H_{11}OH$, $C_6H_{13}NH_2$, CH_3OH, CO_2

CH_3OH

Boiling Point 200

What is vapor pressure?

Vapor pressure is the pressure of a vapor above its liquid.

Boiling Point 400

Which of the following has the highest boiling point?

H_2O, CO_2, CH_4, Kr, NH_3

H_2O

Boiling Point 600

Which of the following has the highest boiling point?

N_2, Br_2, H_2, Cl_2, O_2

Br_2

Boiling Point 800

Which of the following would have the lowest boiling point?

PH_3, H_2S, HCl, SiH_4, H_2O

SiH_4

Boiling Point 1000

Which of the following has the highest melting point?

S_8, I_2, SiO_2, SO_2, C_6H_6

SiO_2 (network solid)

Heating Curve 200

What is a supercooled liquid?

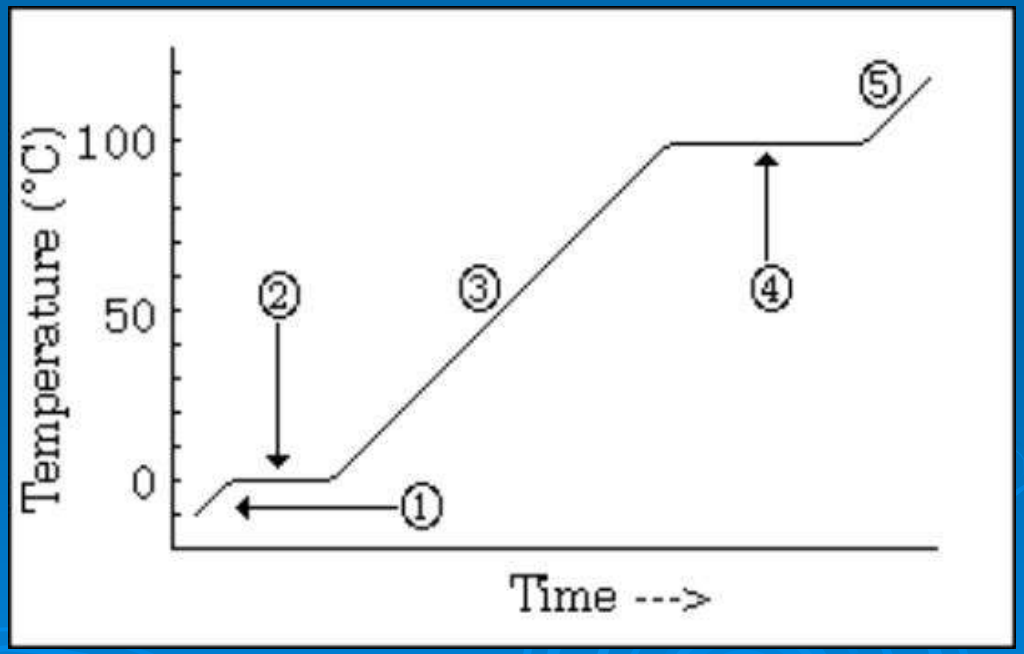
A supercooled liquid is a liquid that has been cooled below the freezing point without being converted to a solid.

Heating Curve 400

What does 2 represent? What formula do we use at 2?

Melting

ΔH_{fus}

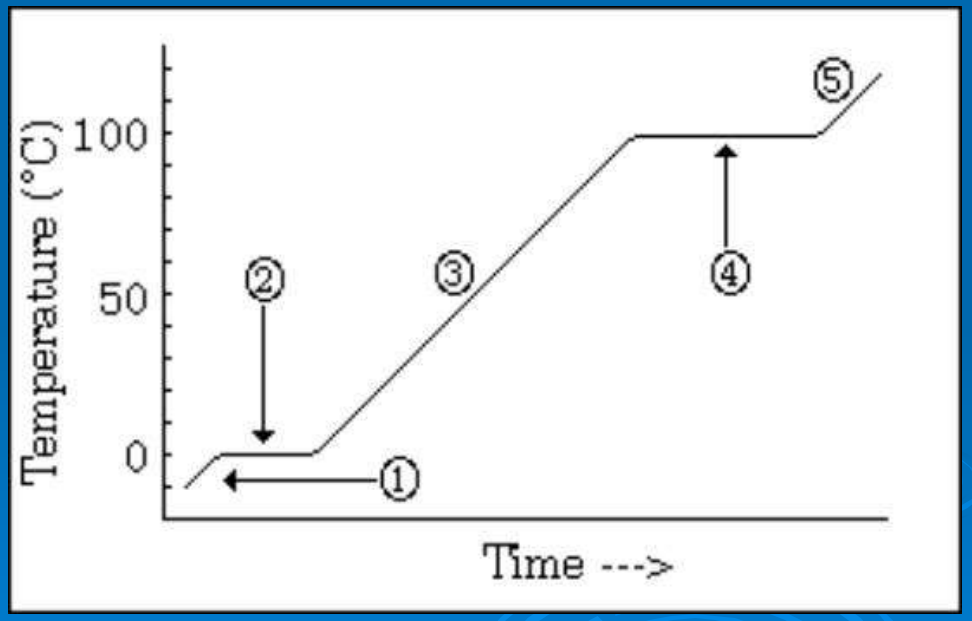


Heating Curve 600

What does 5 represent? What formula do we use at 5?

Gas

$q = mc\Delta T$



Heating Curve 800

What is the change in enthalpy when 1.00 mol of ice at -50.0°C to water at 70.0°C?

c_{ice} = 2.09 J/gK, c_{H2O} = 4.18 J/gK, c_{steam} = 1.84 J/gK, ΔH_{fus} = 6.01 kJ/mol, ΔH_{vap} = 40.67 kJ/mol

13158J

Heating Curve 1000

What is the change in enthalpy when 25.0g of ice at -4°C to steam at 110°C?

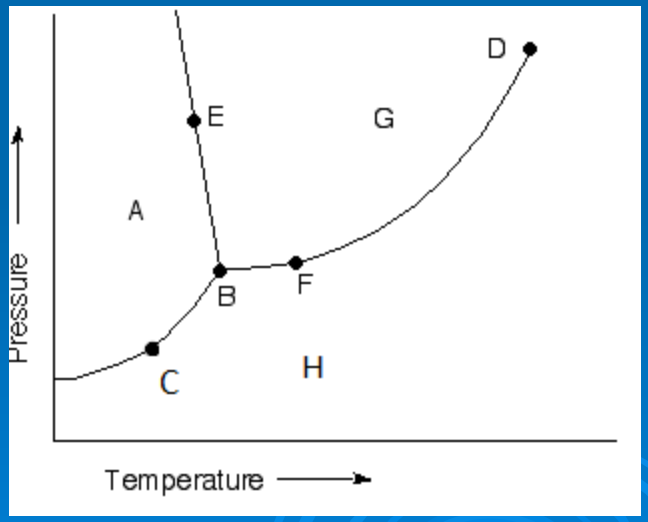
c_{ice} = 2.09 J/gK, c_{H2O} = 4.18 J/gK, c_{steam} = 1.84 J/gK, ΔH_{fus} = 6.01 kJ/mol, ΔH_{vap} = 40.67 kJ/mol

76042J

Phase Diagram 200

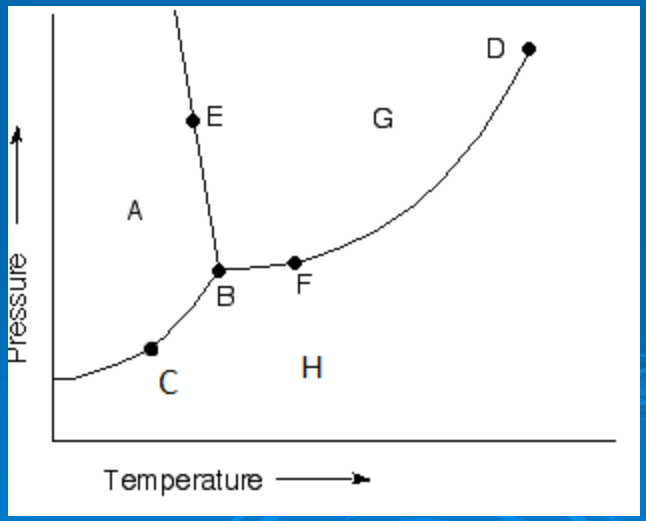
On the phase diagram, which letter corresponds to the critical temperature and critical pressure?

D



Phase Diagram 400

One the phase diagram, which letter corresponds to the gas and solid phases at equilibrium?

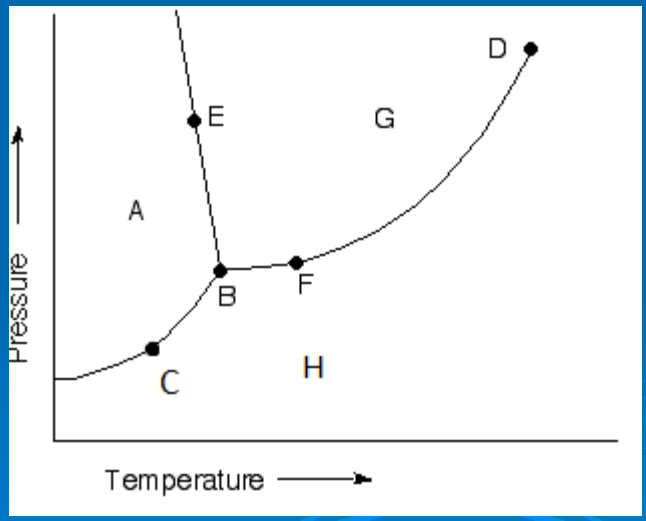


C

Phase Diagram 600

On the phase diagram, which letter corresponds to the solid phase?

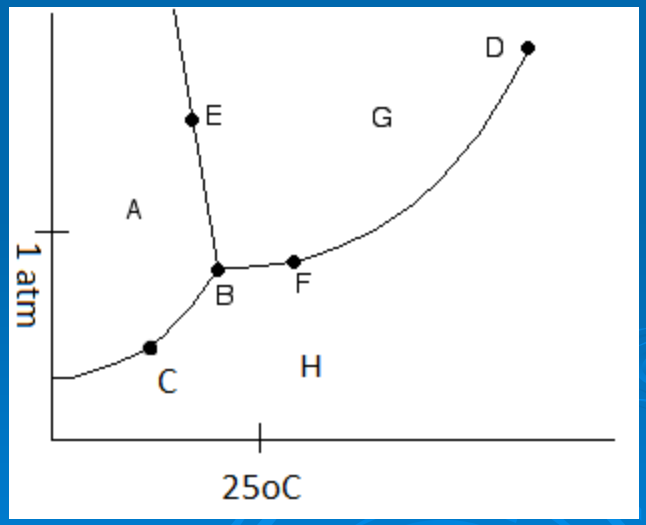
A



Phase Diagram 800

On the phase diagram, which state of matter is the substance at 25°C and 1 atm?

liquid



Phase Diagram 1000

Which of the following statements is always true about a phase diagram?

a. The slope between the liquid and solid phases is negative.

b. The slope between the liquid and solid phases is positive.

c. The slope between the vapor and liquid phases is positive.

d. The pressure at the triple point is greater than 1 atm.

Solids 200

What is the difference in a crystalline solid and an amorphous solid?

Crystals have an orderly repeating 3-D structure. Amorphous solids have a random structure.

Solids 400

_____ solids consist of atoms or molecules held together by dipole forces, dispersion forces, and/or hydrogen bonds.

Molecular

Solids 600

What fraction of the volume of each corner atom is actually within the volume of a face-centered cubic unit cell?

1/8

Solids 800

CsCl crystallizes in a unit cell that contains a Cs^+ ion at the center of a cube and Cl^- ions at each corner. The unit cell of CsCl is _____.

Body-centered cubic

Solids 1000

CsCl crystallizes in a unit cell that contains the Cs^+ ion at the center of a cube that has Cl^- at each corner. How many Cs^+ and Cl^- ions are in the unit cell?

1Cs^+ and 1Cl^-