dicate whether the following statements below are true (T) or false (F):

s increased when isolated atoms or ions come together to form solids. F

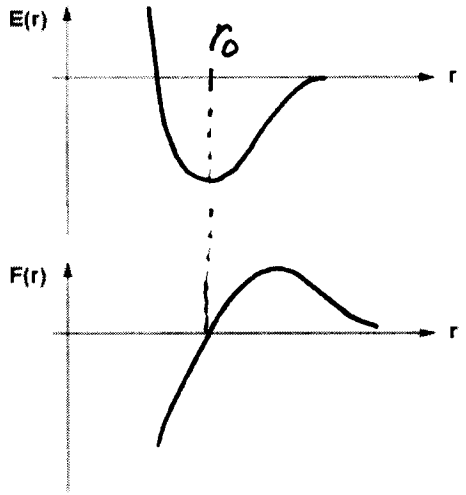
id is stabilized through metallic bonds. F

centered atoms in copper, which has a face centered cubic (FCC) structure, ordination number of 4. F

hylene ~(-CH_2-CH_2-)~, the C-C bonds are covalent. T

nd, all C-C bond angles are approximately 109 degrees. T

Sketch below the curves for the net potential energy E and the net bonding force F ver- distance r. Clearly indicate the equilibrium interatomic spacing r_0 in your plot.



Based on your knowledge on the symmetry of the s and p atomic orbitals, which type you expect to form a close packed crystal structure: a metal with an s outermost shell or termost shell ? Explain.

Spherical symmetry may facilitate close packing, but reality is more complicated.

Give short answers (maximum two sentences) to the following questions.

ionic crystals in general form close-packed structures? Justify your answer.

No. close-packed structures usually require same-sized atoms. Cations & anions vary in size.

BCC crystal structures close-packed? Justify your answer.

No. Coordination number is 8 for BCC.

Vinyl chloride (C_2H_3Cl) and vinyl acetate ($C_2H_3(C_2H_3O_2)$) are used to form a copoly-
molecular weight of 10,520 g/mol and a degree of polymerization of 160 (total number of
many moles of vinyl chloride and vinyl acetate are needed to make one mole of the copoly-

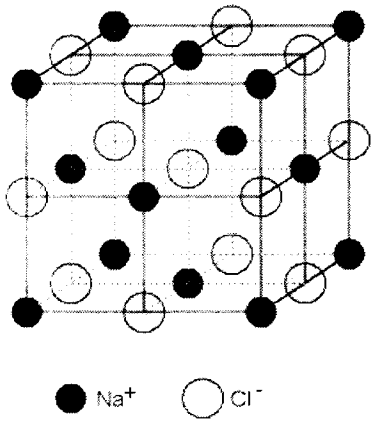
$$\bar{M} = \frac{10520}{160} = 65.75 \text{ g/mol}$$

$$\bar{M} = x_i M_{VC} + (1 - x_i) M_{VA}$$

$$= x_i \times 62.5 + (1 - x_i) \times 86 = 86 - 23.5 x_i$$

$x_i = 0.86$ for VC ; $1 - x_i = 0.14$ for VA

A unit cell of a NaCl crystal structure is shown below.



coordination numbers for cations & anions in the structure? 6 & 6

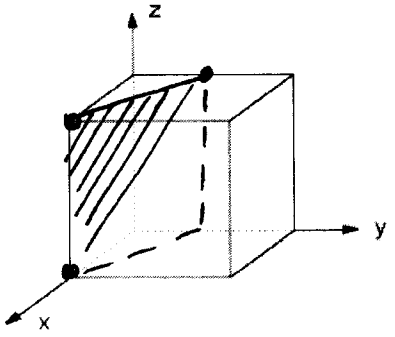
ions of each element belong to one unit cell?

4 each

radii of Na+ and Cl- are approximately 0.102 nm and 0.181 nm respectively. What is the meter of this structure?

$$a = 2r_{Na^+} + 2r_{Cl^-} = 0.566\ nm$$

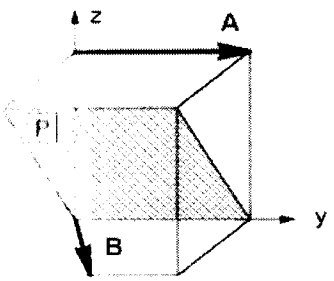
cell shown below, draw the points with position coordinates (1,0,0), (1,0,1), (0,½,1), and Miller indices of the plane determined by these three points.



ice constant of the unit cell above is 0.361 nm, calculate the spacing between two adjacent, planes.

$$d_{hkl} = \frac{a}{\sqrt{h^2+k^2+l^2}} = \frac{0.361}{\sqrt{4+4+0}} = 0.128\ nm$$

ine the directions A and B and the Miller indices of the plane P shown in the graph below. ions fully following the rules will be honored with points.



A : [010]

B : [210]

P : $(\bar{1}01)$ or $(10\bar{1})$

mes into the unit cubes corresponding to the following Miller indices: (120), and $(1\bar{1}0)$.