

MSE 214 (Metals)
Exercise 7 – Introduction
19th November 2025

Question 1.

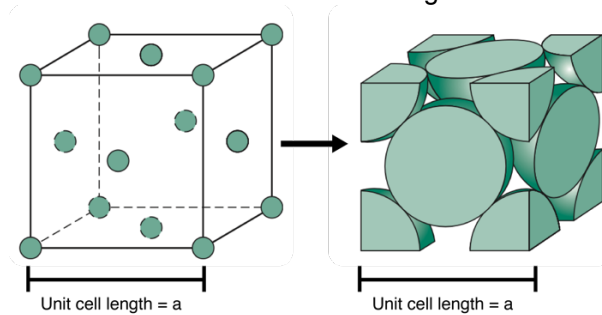
You have two pieces of metal. One is FCC, the other is BCC. Identify two properties or behaviors in which these metals are likely to differ. You can assume that they have the same composition.

Question 2.

Copper has an atomic radius of 0.128 nm, an FCC crystal structure, and an atomic weight of 63.5 g/mol. Using this information, compute the theoretical density of copper and compare it to its experimentally measured density (8.94 g/cm³)

Hint 1: How many atoms are there in an FCC unit cell?

Hint 2: What is the volume of the FCC unit cell? Use the image below to help you calculate it.

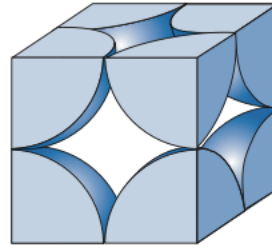
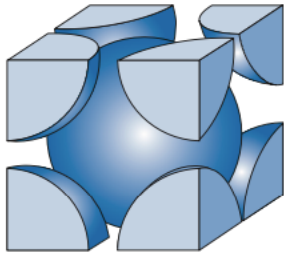


Question 3.

The atomic weight, density and atomic radius for three hypothetical alloys are shown below. For each, determine whether its crystal structure is FCC, BCC, or simple cubic. Justify your choice.

Alloy	Atomic weight (g/mol)	Density (g/cm ³)	Atomic radius (nm)
A	43.1	6.40	0.122
B	184.4	12.30	0.146
C	91.6	9.60	0.137

Hint: Determine the volume of the BCC and simple cubic unit cells using the images below



Question 4.

You are trying to purchase some tungsten. A supplier tells you that their tungsten is highly pure. Their tungsten has a composition of 96 wt% W, 4 wt% O.

Calculate the mol percent of W in this material. Is it actually pure (>90 mol%)?

Question 5.

Give two reasons why manufacturing parts out of refractory metals are difficult.
Hint: Most refractory metals are BCC

Question 6.

Many ships have zinc bars attached to their steel hulls. What is the purpose of the zinc? Why was zinc chosen?

