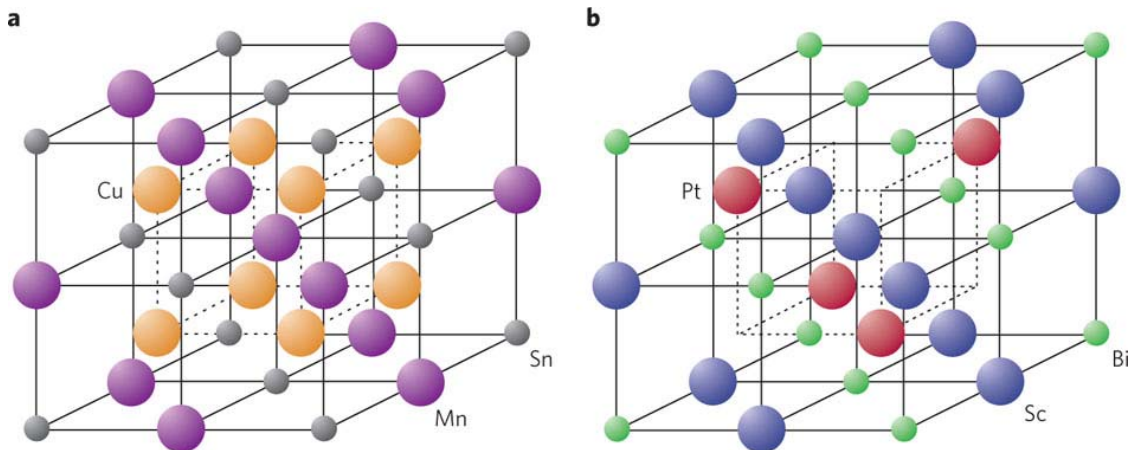


<b>HW 1</b>	<b>Inorganic Materials Chemistry</b>	<b>Name:</b>	
<b>Points:</b>	<b>C7780</b>	<b>Date:</b>	
Max. 100 points	<b>Fall 2022</b>	<b>A</b>	

1. (20 pts) In the crystalline  $\text{Cu}_2\text{O}$ , oxygen atoms possess coordination number 4. What is the coordination number of Cu? Show how you arrived to the answer.

2. (10 pts) A unit cell has in general shape of a) cube b) tetrahedron c) parallelepiped

3. (20 pts) Give stoichiometric formulas for the cubic structures in the picture below. **a** = Heusler compound, **b** = Half-Heusler compound.



4. (25 pts) An octahedral structural unit  $\text{CoO}_6$  possesses following Co–O bond distances (in Å). Use Pauling Rules to establish whether the cobalt cation is in oxidation state  $2+$  or  $3+$ . Use parameters  $R_0 = 1.692 \text{ Å}$  and  $B = 0.30$ .

2x Co1–O1 2.1033(12)

2x Co1–O2 2.0703(12)

2x Co1–O3 2.1204(12)

5. (25 pts) Assume that  $\text{CaO}$  reacts with  $\text{CeO}_2$  and forms  $\text{CaCeO}_3$ . What could be the structure type of this compound? \_\_\_\_\_

Write balanced chemical equations for the reactions taking place at the interfaces I and II (assume counter diffusion of both cations) and calculate the Kirkendall ratio for this process.

