

4. (20 Marks): Describe the processes acting in the formation of the below laterite profile (on the testform). Which elements are retained, and enriched or depleted in which horizon?

		Leached (eluviation), partly retained and enriched (illuviation)?			
(a) Generalized lateritic regolith profile					
Regolith	Lag				
	Soil				
	Fe laterite / Laterite gravel	Pb, Cu, Pb, CS	Fe	Si, Al (kaolinite)	
	Residuum / Laterite crust	CS	Si	✓	
	Mottled zone (kaolinite matrix)	K ✓	Al		
	Pseudohorizon	Plasmic zone, mainly kaolinite and goethite (Primary fabric destroyed)	CS, Cu, Pb, Mg, Li, Fe, Mn, Al	Fe	Si, Al (kaolinite)
			CS	Si	Fe, Al, Cu, Li, Ni, V, Cr
			Pb	Al	Si, Al (kaolinite)
	Saprolite	Saprolite	CS, Cu	Fe	Si, Al (kaolinite); goethite
		>20% weatherable minerals altered (Primary fabric preserved)	Pb, Cu, CS, Mg, Pb, Al	Si	Fe, Al, Cu, Li, Ni, V, Cr
		K, Cu, Mg	Al, Ni	✓	
Saprock	Saprock	Cu, Pb, K	Al	Fe, Ni, Co, V	
	<20% weatherable minerals altered				
Unaltered bedrock		As, Au, Cu, Co, Ni, Mn, Pb, Sb, Sn, U, V, Zn, Zr	Al, Fe, Ni, Co, V	As, Cu, Mn, Pb, Sb, Sn, U, V, Zn, Zr	

During the formation of the laterite profile, processes such as entrainment, transportation via leaching and enrichment occur. Iron, metals and even minerals are hydrolyzed from the respective lateritic gravel. Oxidation and dissolution also occur. New minerals and unweathered minerals are then placed or accumulated to form enriched minerals.

Leaching

→ precipitation

5. (10 Marks): What are the growth conditions of Mn nodules and which elements are enriched in Mn nodules?

The following are the growth conditions of Mn nodules: shallow marine, movement of water from deep to shallow marine for deposition, hot conditions in the sea and also the absence of oxygen. Elements such as Fe, Al, Mg and Si are the main elements which are enriched.