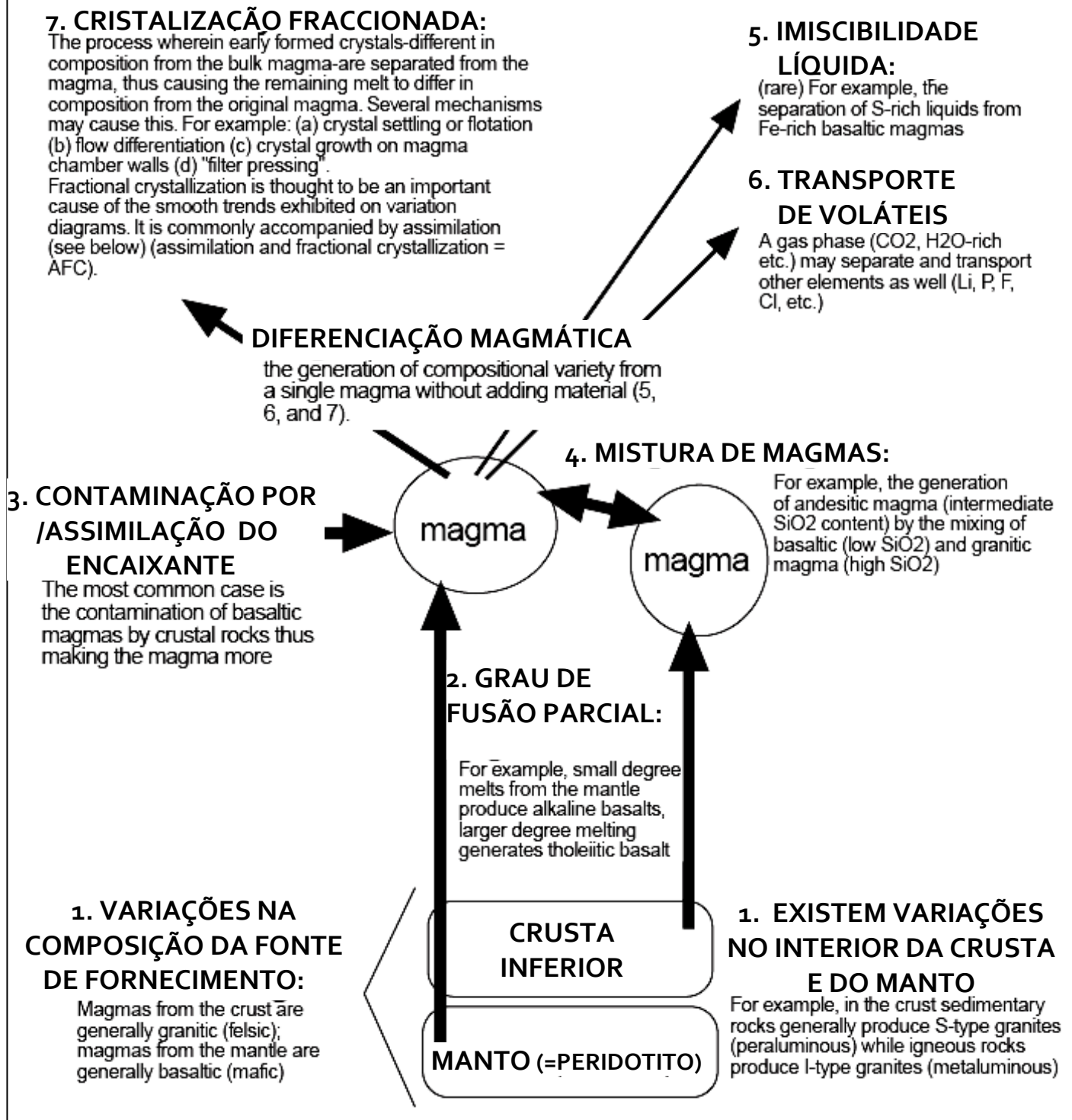


RAZÕES DA VARIEDADE COMPOSICIONAL DE MAGMAS /ROCHAS ÍGNEAS



What causes compositional variety in magmas / igneous rocks?

7. fractional crystallization:

The process wherein early formed crystals-different in composition from the bulk magma-are separated from the magma, thus causing the remaining melt to differ in composition from the original magma. Several mechanisms may cause this. For example: (a) crystal settling or flotation (b) flow differentiation (c) crystal growth on magma chamber walls (d) "filter pressing".

Fractional crystallization is thought to be an important cause of the smooth trends exhibited on variation diagrams. It is commonly accompanied by assimilation (see below) (assimilation and fractional crystallization = AFC).

5. liquid immiscibility:

(rare) For example, the separation of S-rich liquids from Fe-rich basaltic magmas

6. volatile transport:

A gas phase (CO₂, H₂O-rich etc.) may separate and transport other elements as well (Li, P, F, Cl, etc.)

magmatic differentiation = the generation of compositional variety from a single magma without adding material (5, 6, and 7).

3. Contamination by / assimilation of wall rocks

The most common case is the contamination of basaltic magmas by crustal rocks thus making the magma more

4. Magma mixing:

For example, the generation of andesitic magma (intermediate SiO₂ content) by the mixing of basaltic (low SiO₂) and granitic magma (high SiO₂)

2. degree of partial melting:

For example, small degree melts from the mantle produce alkaline basalts, larger degree melting generates tholeiitic basalt

1. variations in the composition of the source region:

Magmas from the crust are generally granitic (felsic); magmas from the mantle are generally basaltic (mafic)

1. There are variations within the crust as well as the mantle:

For example, in the crust sedimentary rocks generally produce S-type granites (peraluminous) while igneous rocks produce I-type granites (metaluminous)

