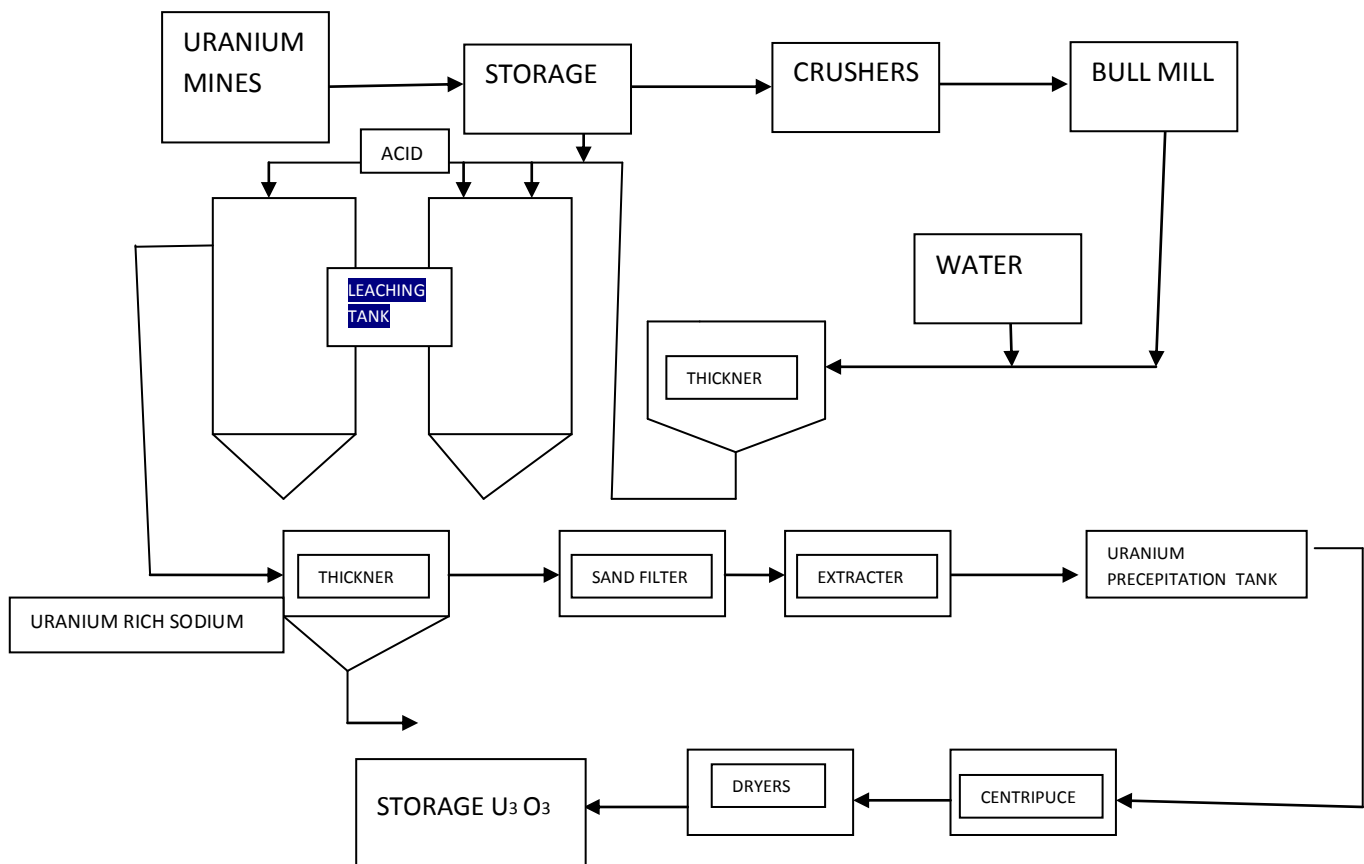


## URANIUM PRODUCTION



Industrial Production of Purified solid Uranium cake – Process flow diagram

### Raw Ore constituents

Ultimate, maximum common uranium containing ore are the mixture of -  $\text{UO}_2$  (basic) and  $\text{UO}_3$  amphoteric oxides.

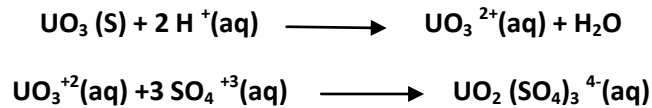
### Process

Preparation of yellow cake solid (**\*Uranium**)  $\text{U}_3\text{O}_8$  is the extraction chemistry - which is often difficult - and metallurgical procedures - vary with - geological environment conditions.

### First Step of Process

The ore is first crushed and ground to liberate mineral particles.

The amphoteric oxide is leached with sulphuric acid. The reaction gives

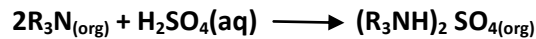


The basic oxides are converted by the same leaching with water soluble  $\text{UO}_2(\text{CO}_3)_3^{4-}(\text{aq})$  ions.

**Two methods** are used to purify and concentrate Uranium **1. Ion Exchange** **2. Solvent Extraction.**

The more common Solvent extraction method uses tertiary amine in kerosene (the organic solvent) used in a continuous process to extract R<sub>3</sub>N amines.

R<sub>3</sub>N amines react with sulphuric acid

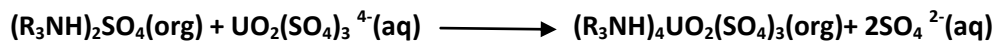


Impurities remain in aqua's phase.

### **Next Step of Process**

Then the amine sulphate extracts the uranium ions into the organic phase.

If the amine is uranium sulphate, the following reaction takes place with uranium sulphate ions



Solvents are removed by evaporating in vacuum.

### **Final Step of Extraction Process**

The neutralized solution is then treated with ammonia to get the precipitate of ammonium di nitrate.  **$(\text{NH}_4)_2\text{U}_2\text{O}_7$** .

Then this ammonium di nitrate  $(\text{NH}_4)_2\text{U}_2\text{O}_7$  is **heated to (yield)** get **purified solid** (\*Uranium)  **$\text{U}_3\text{O}_8$**  the yellow cake.