

## MOLE SIEVE CONTAMINANTS

**M**olecular sieves are mineral materials : they offer a good mechanical resistance and are chemically relatively neutral. However, depending on their composition and on the stream content, side effects may appear. Some contaminants and poisons have to be avoided, or at least quantified in order to address the problem with the suitable product and the right regeneration procedure.

**Heavy liquid hydrocarbons** that enter the bed as droplets with a boiling point higher than the heating temperature of the bed. They will accumulate in the macropores and eventually crack, then polymerize under the action of repeated regenerations, resulting in coke formation that slowly plugs the adsorption sites, leading to a progressive decrease of the adsorption dynamic capacity.  
**Glycol**, carried over from a pre-drying unit, would act the same.

**Amine** carry over from an upstream AGRU would decompose and produce coke as well. In addition, the binder structure will be attacked. With water, cation exchange with the crystal will be stimulated, resulting in an unstable and collapsing crystal structure. The adsorption capacity decrease depends on the quantity of amines.



**H<sub>2</sub>S** : during regeneration (heating), H<sub>2</sub>S will form COS in the presence of CO<sub>2</sub>. In addition, acid attack of the binder and of the zeolite may occur.

**Oxygen** will react with sulphur species (even at ambient temperature) and free elemental sulphur that will block the pores. At higher temperatures, it will react with hydrocarbons and quicken the coke formation phenomena. Due to the combustion of hydrocarbons, the regeneration gas will become wet, reducing the adsorption capacity.

**Caustic**, in the liquid form, is hugely damageable as it destroys the zeolite structure and plugs the bed by building-up to form concrete-like lumps.

**Corrosion Inhibitors** : may affect the adsorption capacity to an extent that depends on the type of inhibitor.

**Olefins** : they are not considered as a contaminant as they are very often part of the stream to purify. However, due to their weak chemical bonds, they are unstable and easily decompose to form coke. They require special products and a soft regeneration procedure.

With more than 40 years experience in adsorption, CECA has developed resistant products and regeneration procedures to prevent most of these effects. In addition to dedicated ranges (Amine Resistant and Acid Resistant grades, COS minimization products), our designs may include guard beds to ensure protection against liquid carry-over. Limited temperatures, intermediate heating step or special regeneration procedures are also part of our customer dedicated strategies to overcome the composition problems and lead to an efficient and trouble-free unit.

Any need in relation with the above ? Any doubt on an existing process and operation problems ? Don't hesitate to contact one of our specialist !

In our next issue : How does the chiller inlet temperature influence my Mole Sieves unit ?



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