The key features and procedures of polyoxometalates (poms)

Polyoxometalates (POMs) display a well explored area of inorganic metal oxide-derived materials, and they have shown potential for applications in the areas of electrochemistry, catalysis, magnetism, medicine, materials design(Jacks32). POMs, isopoly[MmOy]p- and heteropolyanions [XxMmOy]q- are inorganic metal-oxide cluster materials with a large diversity in geometrical structures and charge. The structure of molecules specifies their function, and this applies to POMs also. It follows that if the structure of POMs could be rationally designed, then the engineering of POMs to a particular function becomes a real possibility. POMs basically exhibit wealthy electrochemistry due to their fully oxidized framework. Since it is common for POMs to accept electrons without significant geometrical changes. So Polyoxometalates with favorable oxidation potentials have been used as oxidation catalysis. Hybrid materials based POMs is another memorable area of polyanions chemistry wherein a metalloorganic catalytic center is coupled with a POM. Therefore, solubility and electronic features of POM based catalysts may be modified to meliorated reactivity of reactions. In the same vein, Polyanilines (PANI) have revealed as an appropriate carrier due to their environmental stability, exclusive electronic properties and walkaway synthesis. In addition, conductance of polyaniline determined through various factors like chain length, morphology, texture and degree of crystallization of the polymer films. Polyaniline can be emerged in three oxidation states, leucoemeraldine (C6H4NH)n, emeraldine ([C6H4NH]2[C6H4N]2)n and pernigraniline (C6H4N)n. Among them only emeraldine salt is conductor. Besides, NiO has achieved more attention due to its features like large theoretical specific capacitance and practical

accessibility. As well as, NiO is not employed as a stable catalyst lonely since it can be easily reduced to Ni0. (Nio 17-20. S. kh)

So metalorganic polyoxometalate hybrids as a new efficient catalysts have been enlarged to remove sulfur-containing molecules from petroleum feedstocks. Crude oil is still considered as one of the most important sources of energy despite the high interest in renewable sources in recent years. Combustion oil produces SOx derivatives which are the main source of air pollution, acid rain and sickness.

Therefore, there are various laws in order to environmental protection that limited the sulfur content. In the oil refinery industry, hydrodesulfurization (HDS) is a conventional procedure to reduce the sulfur content to a level of ~ 500 ppm. But, some recalcitrant aromatic compounds (RAC) such as thiophenes (TH), benzothiophenes (BT) and dibenzothiophenes (DBT) can not be eliminated by this method. Owing to the inherent difficulties of HDS, oxidative desulfurization (ODS) has attracted consequential attention due to mild reaction conditions and high desulfurization rate. In the mentioned process, the sulfur-content compounds are oxidized to sulfuxides and sulfunes in the presence of an appropriate catalyst. Obtained products can be separetad through various segregate techniques like solvent extraction or adsorption on a solid adsorbent (9, 5, s. kh).

The principal objectives of this report were to fabricate the novel impressive heterogeneous catalyst. The synthesized Polymer/MetalOxide/POM (PMP) catalyst was used in the oxidative desulfurization technology which involves oxidation of sulfur-containing molecules in the presence of an oxidant.

Among the species of POMs, the Keggin type is the most stable with a diameter of ~1. 2 nm and expresseed via the formula [XM12O40]x-8, where x is its oxidation state. Therefore, Lacunary derivative of the Keggin Phosphotungstic H4[PW11Mn] was synthesized as a highly efficient homogeneous catalyst. To recover POM catalysts, different recyclable catalytic systems have been reported. Despite the various utilizations of organic polymers in developing recyclable catalytic systems, the synthesis of PW11Mn@NiO@PANI composite materials is still unexplored.(Dr. REz. 9)