The discussed below. 3.1 catalyst some metal, metal

The PMNC prepared frominorganic materials using in situ polymerization and composite formationare suitable as catalysts, sensors, reducing agents and to microbe killingagents. 23 Scientists have synthesized zincoxide polyaniline nanocomposite which has improved interface. Due to itssynergistic effects it exhibited thousand times better electrical conductivity. 24Addition of nanoparticlesin polymer matrix improves the polymer properties and produce PNCs with desiredproperties. Catalytic, adsorption, and mechanical properties of PNCs aregenerally used for the purification of water.

These properties of PNCs arebriefly discussed below. 3. 1 CatalystSome metal, metal oxide, and sulfides are used as catalysts for purification of water both in thepresence and absence of light. 25 Reports says that a wide variety of compoundsare catalytically degraded. 26, 27 Metalcompounds like TiO2, ZnO, Fe2O3, CdS, GaP, andZnS are used for catalytic degradation due to their interaction with the ionicsurface and its modified surface tension.

28Titanium dioxide (TiO2)and zinc oxide (ZnO) are low cost and have high photo catalytic activity, and stabilityand have great importance. 29, 30 Forexample, ZnO/PMMA nanocomposite is used for photocatalyitc degradation ofphenol and methylene blue. 31Scheme6: Photolyticdegradation methylene blue over ZnO/PMMA composites as a function of theirradiation timeElectrons are released bythese metal oxides on irradiation with UV light. This will react with the H2Oand O2 molecules which are adhered on to its surface. It results in theproduction of highly reactive oxygen species (ROS) like peroxides, superoxides, singlet oxygen and hydroxyl radicals which are capable of degrading organicwater pollutants efficiently. 32 ROS also has antibacterial effect and it could inactivate

themicrobes present in the polluted water. 33 But these metals’presence in water is harmful to the ecosystem and human life.

Therefore we usenanocomposites in which these metals are inserted. This could help in sustainedrelease of the ions or electrons. Examples are Titana/PMMA nanocomposite, silver embedded aluminum oxyhydroxide–chitosan nanocomposite, etc. 34, 353. 2 Adsorption behaviorDue to the high surfacearea of nanoparticles, nanocomposites are known for its high adsorptionbehavior. Since it is optimized it can be used it is suitable for applicationslike water purification, drug delivery, chemical sensor, etc. Toxic dyes, metalions and microbes are easily removed using this from waste water.

36Scheme 7: Shematicillustration for chromium adsorption on Chitosan/Fe-Carbon nanofibers andpolyvinyl alcohol nanocompositeAdsorption is dependenton the ionic or surface interaction. It needs selective interaction site. Thiscan be synchronized by having hydrophobic and hydrophilic behaviors in thematrix. Most of the nanocomposites possess this quality which makes them aperfect adsorbent. Interpenetrating nature and magnetic nature of thenanocomposites also increases the adsorption capacity. Nanocomposites thatconsists of carbon nanotubes (CNT) have high porosity, affinity of solvents , better selectivity and rejectivity of molecules and ions.

Nanocomposites thathave optimized porosity are good in mass transfer, lighter weight, liquidretention. Chitosan and its nano derivatives are reported as a good adsorbentsfor the removal of water contaminants. But like

everything in the world it toohave a disadvantage as it have low mechanical strength. 37