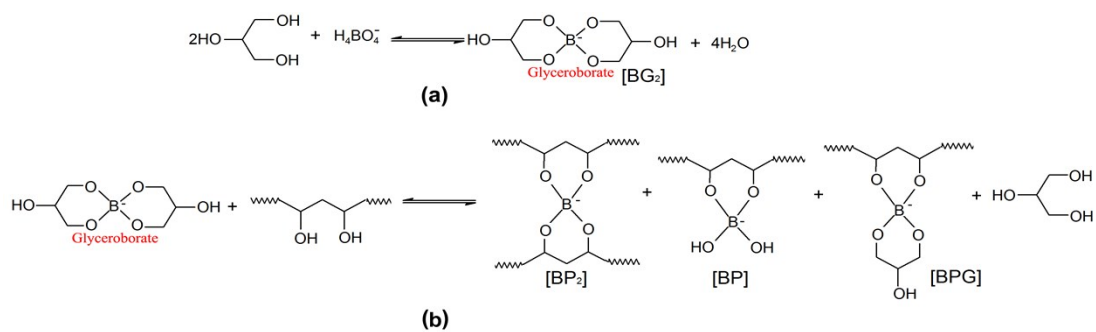
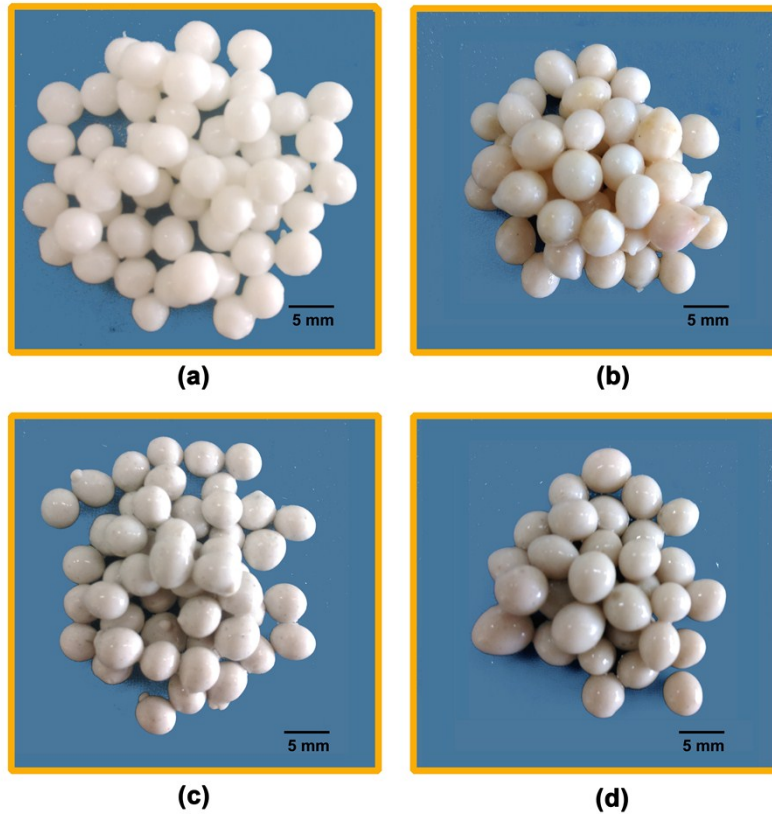


**Fig.1s Schematic representation of reaction formula of PVA with  $\text{H}_3\text{BO}_3$**



**Fig.2s Schematic representation of reaction formula of PVA/glycerol with  $\text{H}_3\text{BO}_3$**



**Fig.3s** The image of the PVA/1.5 wt % glycerol hydrogel beads before aeration (a), PVA/1.5 wt % glycerol hydrogel beads after aeration for 22 months (b), PVA/1.5 wt % glycerol hydrogel beads immobilized with microorganism before aeration (c) and PVA/1.5 wt % glycerol hydrogel beads immobilized with microorganism after aeration for 11 months (d)