PMB 220 Homework
Coates Week 2 (class week 8)

1. 2,6-Anthrahydroquinone disulfonate ($C_{14}H_8O_8S_2^{2-}$) can be used as an electron donor coupled to perchlorate (ClO_4^-) reduction by perchlorate reducing bacteria. In this metabolism the organisms oxidize the 2,6-anthrahydroquinone disulfonate to its oxidized form 2,6 anthrquinone disulfonate ($C_{14}H_6O_8S_2^{2-}$). Show the balanced reaction for the metabolism. In your answer state how many electrons are donated by the 2,6-anthrahydroquinone disulfonate and how many are accepted by the perchlorate.

2. A bioremediation firm trying to remove nitrate from groundwater develops an in-situ engineered bioremediation strategy by injecting an aqueous solution of glucose. Although initially effective, over the long-term this results in plugging of the near-well aquifer matrix (biofouling), alteration of the physical-chemical nature of the aquifer matrix (mineral content, hydraulic conductivity, pH, etc.), and a further reduction in water quality through the direct or indirect release of undesirable end-products (Fe(II), HS^-, CH_4, mobilized heavy metals, etc.). Can you explain what has happened and outline a corrective action for the future.