DE LA SALLE UNIVERSITY

A STUDY OF THE EFFECT OF METHYLMERCURY ON DEOXYRIBONUCLEIC ACID (DNA) HELICITY USING UV ABSORPTION SPECTROSCOPY

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ABSTRACT

A pH- and concentration-dependent interaction of methylmercury with DNA was observed using UV absorption spectroscopy. Methylmercury interacts with the oxygen on the phosphate moeities of DNA at pH 5.7, 7.0 and 8.0 when the methylmercury to DNA mole ratio was 1.08 to 6.47 resulting to stabilization of the DNA double helix as was evidenced by reduction of UV absorption at 260 nm (hypochromicity). Methylmercury interacts with the amino substituents of the base moeities of DNA at pH 7.0 where the methylmercury to DNA mole ratio was 8.62 resulting to destabilization or denaturation of DNA as evidenced by an increase in UV absorption at 260 nm (hyperchromicity). At pH 5.7 and 8.0 and at methylmercury to DNA mole ratio of 8.62, hypochromicity was observed. Addition of sodium chloride in the amount required to give methylmercury to sodium chloride mole ratio of 1 in the denatured DNA recovers the original native DNA indicating preferential binding of methylmercury with chloride over that with base moeities of DNA.

Melting temperature (T_m) of 87°C, % GC pairs of 40.7 and % hyperchromicity of 14.2 in 5 mM $NaNO_3$ and 5 mM NaH_2PO_4 - Na_2HPO_4 buffer indicates that the DNA sample is relatively stable and is mainly in the two-stranded helical structure.