

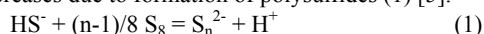
## Solubility of cyclooctasulfur in water as a function of temperature, salinity and sulfide concentration

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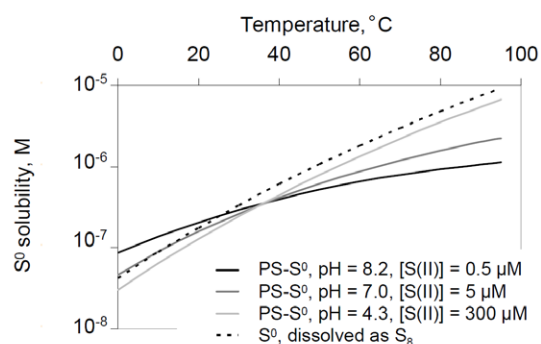
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Cyclooctasulfur and inorganic polysulfides are important sulfide oxidation intermediates and bacterial substrates. Solubility of rhombic sulfur ( $\alpha$ -S<sub>8</sub>) in water was studied as a function of temperature by derivatization with hot hydrogen cyanide solution followed by HPLC-UV analysis of formed thiocyanate [1]. Sulfur solubility in pure water was found to increase with temperature from 6.1 nmol l<sup>-1</sup> S<sub>8</sub> at 4°C to 478 nmol l<sup>-1</sup> S<sub>8</sub> at 80 °C. Solubility of sulfur in sea water was found to be 61±13% of the solubility in pure water regardless of the temperature [2]. Results of this work are in good agreement with reported values for solubility of  $\alpha$ -S<sub>8</sub> in water at 25°C [3, 4]. In the presence of hydrogen sulfide and its deprotonated forms the solubility of cyclooctasulfur in water increases due to formation of polysulfides (1) [5].



At pH values of 8.2, 7.0 and 4.3 polysulfidic zero-valent sulfur dominates over dissolved  $\alpha$ -S<sub>8</sub> at [S(II)] > 0.5  $\mu\text{M}$ , 5  $\mu\text{M}$  and 300  $\mu\text{M}$  respectively.



**Figure 1.** Solubility of cyclooctasulfur S<sup>0</sup> and polysulfide (PS) S<sup>0</sup> at infinite dilution.

[1] Kamyshny (2009) *Limnol. Oceanogr.: Methods* **7**, 442–448. [2] Kamyshny (2009) *Geochim. Cosmochim. Acta* **73**, 6022–6028. [3] Boulegue (1978) *Phosphorus Sulfur Rel. Elem.* **5**, 127–128. [4] Wang & Tessier (2009) *Env. Sci. Tech.* **43**, 7252–7257. [5] Kamyshny *et al.* (2007) *Env. Sci. Tech.* **41**, 2395–2400.

## On the ‘Dipole CHIM’ technique electrified by low voltage dipole

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Concealed deposits are dissolved in electrogeochemical forms. Metal anionic and cationic species of elements migrate to near the surface driven by all kinds of geological forces, and are enriched therein. The metal ions of electromobile forms are extracted in either anodes or cathodes with the aid of artificial electric field, which are called CHIM anomalies [1]. CHIM ionic haloes, dynamically related to concealed deposits, are in mobile form. The element composition of the haloes is normally the same as that of the ores, and the haloes occur typically directly over the source of the deposits [2, 3]. With this new halo-forming theory [1], the extract tests with the single cathode electrified by low voltage ‘dipole’ was first carried out at several known mine areas, and their feasibility and effectiveness were verified [4]. Recognizing that anionic as well as cationic species may provide useful information [5], ‘Dipole CHIM’ technique electrified by low voltage dipole was then proposed and developed. Field tests of this innovative technique were undertaken with great success, which had enabled us to identify clearly multi-element anomalies at Yingezhuang gold deposit in Shandong, at 210 gold deposit in Xinjiang and at Jinchuan copper-nickel deposit in Gansu. The test results indicate that anionic species anomalies of elements are very obvious above the existing ore bodies, and the sum of anionic and cationic species anomalies enables the identification of the position of the deeply buried ore bodies. This new CHIM technique, characterized by simple equipment, easy operation and low cost, enables simultaneous extraction of anionic and cationic species of elements, from which more information can be derived with higher extraction efficiency. This technique is therefore suitable particularly for field surveys.

[1] Kang *et al.* (2008) *Bulletin of Mineralogy, Petrology & Geochemistry* **27**(2), 195-199. [2] Alekseev *et al.* (1996) *J. Geochem. Explor.* **56**, 79-86. [3] Leinz *et al.* (1998) *J. Geochem. Explor.* **61**, 57-86. [4] Kang *et al.* (2003) *Geology & Prospecting* **39**(5), 63-66. [5] Levitski *et al.* (1996) *J. Geochem. Explor.* **57**, 101-114.