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References

1 B. Rosenberg, L. Van Camp, J. E. Trosko and V. H. Mansour, *Nature*, 1969, **222**, (5191), 385
2 B. Rosenberg, L. Van Camp and T. Krigas, *Nature*, 1965, **205**, (4972), 698
3 For a full account of the clinical work see "Recent Results in Cancer Research", Vol. 48, ed. T. A. Connors and J. J. Roberts, Springer-Verlag, Berlin, 1974
4 B. Rosenberg, L. Van Camp. E. B. Grimley and A. J. Thomson, *J. Biol. Chem.*, 1967, **242**, (6), 1347
5 K. V. Shooter, R. Howse, R. K. Merrifield and A. B. Robins, *Chem.-Biol. Interact.*, 1972, **5**, (5), 289
6 S. Reslová, *Chem.-Biol. Interact.*, 1971–2, **4**, (1), 66
7 For a recent review see M. J. Cleare and J. D. Hoeschele, *Platinum Metals Rev.*, 1973, **17**, (1), 2
8 D. M. Taylor, J. D. Jones and A. B. Robins, *Biochem. Pharmacol.*, 1973, **22**, (7), 833
9 T. A. Connors, M. Jones, W. C. J. Ross, P. D. Braddock, A. R. Khokhar and M. L. Tobe, *Chem.-Biol. Interact.*, 1972, **5**, (6), 415
10 J. J. Roberts and J. M. Pascoe, *Nature*, 1972, **235**, (5336), 282
11 J. M. Pascoe and J. J. Roberts, *Biochem. Pharmacol.*, 1974, **23**, (9), 1345 and 1359
12 H. C. Harder and B. Rosenberg, *Int. J. Cancer*, 1970, **6**, (2), 207
13 See A. Loveless, "Genetic and Allied Effects of Alkylating Agents", Butterworths, London, 1966
14 See J. D. Watson, "Molecular Biology of the Gene", W. A. Benjamin, Inc., New York, 1970
15 P. Horáček and J. Drobník, *Biochim. Biophys. Acta*, 1971, **254**, (2), 341; S. Mansy, Ph.D. Thesis, Michigan State University, 1972
16 J. A. Stanko, reported in Ref. 3
17 S. Mansy, B. Rosenberg and A. J. Thomson, *J. Am. Chem. Soc.*, 1973, **95**, (5), 1633
18 I. A. G. Roos and A. J. Thomson, reported in Ref. 3
19 A. B. Robins, *Chem.-Biol. Interact.*, 1973, **6**, (1), 35, and 1973, **7**, (1), 11
20 P. J. Stone, A. D. Kelman and F. M. Sinex, *Nature*, 25 Oct., 1974, **251**, 736
21 L. Munchausen and R. A. Rahn, submitted to *Biochim. Biophys. Acta*
22 I. A. G. Roos, A. J. Thomson and S. Mansy, *J. Am. Chem. Soc.*, 1974, **96**, (20), 6484
23 D. M. L. Goodgame, I. Jeeves, F. L. Phillips and A. C. Skapski, *Biochim. Biophys. Acta*, 1975, **378**, (1), 153
24 I. A. G. Roos. To be published in proceedings of conference "Metals in Medicine", Sydney, August, 1975

Superior Thermocouple for Cryogenic Use

A NEW POSITIVE NOBLE METAL THERMOELEMENT

As the applications of low temperature technology increase so does the need for reliable means of measuring the temperatures involved. Thermocouples using limbs of material specially developed for the purpose can give sensitivity reproducible results, but only over a limited temperature range. Alloys of pure gold containing very small amounts of iron, of the order of 0.07 atomic per cent iron, have large thermoelectric powers and are successfully coupled with either copper or Chromel arms for cryogenic purposes but both have disadvantages.

Investigations carried out by V. M. Beilin, L. A. Medvedeva, I. L. Rogel'berg and T. F. Tarasova of the State Scientific Research and Project Planning Institute of Alloys and Treatment of Non-Ferrous Metals, Moscow, and reported in *Cryogenics*, 1976, **16**, (9), 551–552, have resulted in the production of a positive limb made from palladium-0.8 atomic per cent chromium-0.6 atomic per cent ruthenium. The alloy was prepared by arc melting, using a non-consumable tungsten electrode and an argon atmosphere. The resulting ingot was mechanically worked to 0.2 mm diameter wire, then vacuum annealed for 1 hour at 800°C. When used with the gold-iron negative limb the thermocouple has a sensitivity better than 15 μV/K over the temperature range 2 to 100K and the calibration is practically linear over this range, an important consideration for temperature control systems. Electromotive force against temperature measurements, and calculated sensitivity vs. temperature data are presented graphically. In each case the corresponding curves for copper/gold-iron and Chromel/gold-iron are also given.

Both limbs of this thermocouple consist of noble metals having stable reproducible properties thus suggesting that, as well as the obvious industrial applications, there could well be a future use as a reference standard.