Construction of calomel electrode pdf

Describe the construction of calomel electrode. Construction of saturated calomel electrode. Explain construction of calomel electrode.

Electrodo_costruzioni A combined electrode is a reference electrode and a combined reference electrode in a single body that is easy to use and popular due to its compactness. A minimum quantity of sample is required due to the close proximity to the rh reactive membrane and liquid junction. Solution-1: sample to measure solution-2: known buffer solution (7 pH) Reference-1: Silver wire in a salt bridge (KCI) Reference-2: Silver thread in a bridge salt (KCI) Combined glass electrodes mainly have an anti-fouling angular ceramic junction. The annular junction is formulated with a special ceramic surrounding the glass light bulb. Numerous pores in the ceramic provide a lower resistance and more stable pH readings. The combined electrodes for the epoxy body are standard with a specially formulated porous ceramic junction. The sleeve joints provide maximum flow rate for difficult samples. A double-sugal reference is built with an AG / AGCL internal chamber and a chemically compatible reference solution in the outdoor chamber. It is recommended for samples containing organic compounds, proteins, heavy metals and other compounds that interact with silver, such as bromides, iodids, cyanides and sulphides. The general glass and low temperature is particularly suitable for low temperature solutions, non-aqueous solutions and pH measurements under 12 pH. The universal glass is more suitable for most pH measurements in which it is present minimum or NO NA +. It is a low-resistant glass with a very fast and stable response and is designed for pH ranges from 0 to 13 and temperatures from 0 Â ° to 135 Â ° C. The elevated pH, the glass of sodium ion errors Low is particularly formulated for long-term continuous use at high temperatures, in particular in strong alkaline solutions greater than pH 11. Experiences that experience the ionic error NA + negligible over 13 pH. The impedance of the glass is much higher than the other glasses, and a more slow response will be lived at ambient temperatures and below. The response time will increase when the temperature is high. Calomel reference electrodes (HG / HG2CL2) can provide very accurate potentials. Both its reproducibility and the potential stability are higher than those of the AG / AGCL electrode, even if only at a constant and relatively low temperature. The Calomel is subject to a constant and relatively low temperature fluctuation with a temperature limitation of 80 ° C. The silver / silver chloride electrodes (AG / AGCL) are largely free of hysteresis and can be used At higher temperatures with coefficients at lower temperature. AG / AGCL is the best reference for general purposes with a wide range of temperatures (-5 Â ° to 110 Â ° C). Reference Reference Cell: selected for high precision, stability and longer electrode life. Rechargeable types sacrifice the convenience and maintenance facility. Sealed reference cell: Reference electrodes filled in sealed gels are designed for comfort in which minimal maintenance is required. The slightly lower precision and the shortest life must be taken into consideration. Glass body electrodes: ideally suitable for most routine pH measurements for accuracy, high temperature and cleaning facility. Epoxy body electrodes: a good choice for applications where handling and approximate break are an important problem. They are mostly only for aqueous solutions thanks to the limitation of detergent agents. Temperature range, measurement interval and precision are generally lower than the glass probes. electrodo_construction.txt Â · Last modification: 18/10/2019 10:20 by Pieter L'Eduuladder is one Of students, teachers and programmers only interested in making you pass any exam. So we help you solve your academic and programming questions fast.in eduulaaddder you can ask, respond, listen, earn and download questions and questions about documents. Related videos of your favorite subject. Connect with students of different parts of the world. Apply or post works, courses, internships and volunteer opportunities. For Freedersee our teamWondering on how to keep quality? Unresolved questions? Ask questions questions Questions The electrode in Calomelano (SCE) is a reference electrode based on the reaction between elementary mercury and mercury chloride (i). It has been widely replaced by the silver chloride electrode, however the electrode in Calomelano has a reputation to be more robust. The aqueous phase in contact with mercury and mercury (i) chloride (HG2CL2, "Calomel") is a saturated solution of potassium chloride in water. The electrode is normally connected via a porous septum to the solution in which the other electrode is immersed. This porous septum is a saline bridge. In the notation cell the electrode is written as: cl a (4 m) | Hg 2 cl 2 (s) | Hg (L) | Pt {displaystyle {ce {{cl ^ {-}} (4m) | {HG2CL2 (s)} | {Hg (L)} | PT}}} Theory of electrolysis Solubility Product The electrode is based on the REDOX HG 2 + 2 + 2 reactions and Ã, Â½ Ã, Ã, 2 Hg (L), with and Hg 2 + 2 / Hg 0 = + 0,80 v Ã, {displaystyle {ce {hg2 ^ 2 + + 2e ^ - 2hg (l)}}, qquad {{ce with}} quad and _ {{{ce hg2 ^ 2 + / hg}}} ^ {0} = + 0.80 {ce {v}}} hg 2 cl 2 + 2 and Ã, Ã ã, ã, 2 hg (l) + 2 cl Ã ¢ , with and hg 2 cl 2 / hg, cl to 0 = + 0.27 v ã, {displaystyle {ce {hg2cl2 + 2e ^ - 2hg (l) + 2cl ^ -}}, qquad { ce {}} with quad e_ {{ce {hg2cl2 / hg, cl -}}} ^ {0} = + 0.27 {ce {v}}} The medium reactions can be balanced the following reaction Hg 2 + 2 + 2 cl Ã ¢ + 2 hg (l) Ã ¢ Ã ¢ Ã ã, Ã, Hg 2 cl 2 (s) + 2 hg (l), with and hg 2 cl 2 / hg 2 + 2, cl a 0 = + 0.53 V Ã, {DisplayStyle {CE {HG2 ^ 2 + + 2CL ^ - + 2Hg (L) HG2CL2 (s) + 2Hg (L)}}, QQUAD {CE { }} with quad and _ {{{ce hg2cl2 / hg2 ^ 2 +, cl -}}} ^ {0} = + 0.53 {ce {v}}}. Which can be simplified for the precipitation reaction, with the balance of the solubility product. Hg 2 + 2 + 2 cl ã, Ã Ã Ã, Ã, Hg 2 cl 2 (s), k sp = a hg 2 + 2 a cl 2 = [hg 2 + 2] a [cl a] 2 {displaystyle { {ce hg2 ^ 2 + + 2cl ^ - hg2cl2 (s)}}, qquad k_ {sp} = a _ {{{ce hg2 ^ 2 +}}} an {{ce {cl -}}} ^ {2} = [{ce {hg2 ^ 2 +}}] cdot [{ce {cl -}}] ^ {2}} The nernst equations for these half reactions are: {e 1 2 Cathode = and Hg 2 + 2 / Hg 0 Ã ¢ RT 2 F LN UN Â¡1 A Hg 2 + 2 in which and Hg 2 + 2 / Hg 0 = + 0.80 V Ã ,. And 1 2 anode = and hg 2 cl 2 / hg, cl to 0 a rt 2 f ln a Â¡un cl 2, in which and hg 2 cl 2 / hg, cl to 0 = + 0.27 v ã ,. {DisplayStyle {Begin {cases} and _ {{frac {1} {2}} {ce {cathodo}}} & = e _ {{ce {hg_2 ^ 2 + / hg}}} ^ { 0} - {frac {rt} {2f}} ln {frac {1} {a _ {{ce {hg2 ^ 2 +}}}}} qquad & {text {where}} quad e_ {{ce {hg2 ^ 2 + / hg}}} ^ {0} = + 0.80 {ce {v}}. E _ {{frac {1} {2}} {ce {anode}}} & = e _{{ce {hg2cl2 / hg, cl -}}} ^ {0} - {frac { Rt} {2f}} ln un _ {{ce {cl -}}} ^ {2} qquad & {text {in which}} quad and _ {{{ce hg2cl2 / hg, cl - }}}. {0} ^ = + 0.27 {ce {v}}} {cases}}} The nernst equation for the balanced reaction is: cells e = and 1 2 cathode ae 1 2 anode = And HG 2 CL 2 / Hg 2 + 2, CL A 0 A RT 2 F LN Ã ¢ Â¡1 [2 Hg 2 +] A [cl Ã ¢] 2 = and Hg 2 cl 2 / hg 2 + 2, cl A 0 A RT 2 F LN A Â¡1 K SP in which and Hg 2 CL 2 / Hg 2 2 +, CL A 0 = + 0.53 Ã, V {DisplayStyle {Begin {aligned} and _ {{ ce {cell}}} & = e _ {{frac {1} {2}} {ceto}}} - e _ {{frac {1} {2}} {ce {anode} }} & = e _ {{ce {hg2cl2 / hg2 ^ 2 +, cl -}}} ^ {0} - {frac {rt} {2f}} ln {frac {1} {{ ce {[hg2 ^ 2 +]}} cdot {ce {[cl ^ -]}} ^ {2}}} {{{ce {hg2cl2 / hg2 ^ 2 +, cl - }}} ^ {0} - {frac {rt} {2f}} ln {fr ac {1} {k_ {sp}}} qquad {text {}} quad and _ {{} {hg2cl2 / hg2 ^ 2 +, cl -}}} ^ {0} = + 0.53 {ce {v}} end {aligned}}} where e0 is the potential reduction standard for the Reaction and AHG is the activity for Mercury Cation (the activity for a liquid of 1 molar is 1). To the balance, Ãž g = a n fe = 0 j / mol {displaystyle delta g = -nfe = 0 mathrm {j / mol}}, or equivalent and cell = 0 v Ã, {displaystyle e_ { text {cell}} = 0 mathrm {v}}. This equality allows us to find the product of ELLE = E HG 2 CLI 2 CLAN 2 + 2, CL A 0 a RT 2 = 2 HG 2 FLO â.t SP = 0 \ disclaystyle it {{\ text {} {} {} {} {} {} { 2f}} {Ln {\ FROC {1} {{\ c {\ Ce {[Cl ^ -]}} ^ {2}}} = + 0.53 + {\ frac {RT} {2F}} \ ln {K_ {sp}} = 0 \ {\ ce {V} }} ln a Â¡K sp = 0.53 Ã ¢ Ã ¢ 2 FRTK sp = 0.53 and Ã ¢ Ã ¢ 2 FRT = [Hg 2 + 2] a [Ã ¢ Cl] 2 = 1.184 a 10 a 18 {\ displaystyle {\ begin {aligned} \ ln {K_ {SP}} & = - 0:53 \ cdot {\ frac {2F} {RT}} \\ & K_ {SP} = e ^ {- 0:53 \ cdot {\ 2F frac {} {RT}}} \\ & = [{\ {^ ce Hg2 + 2}}] \ cdot [{\ ce {Cl -}}] ^ {2} = 1.184 \ times 10 ^ {- 18 } \ end {}}} aligned due to the high concentration of chloride ions, the concentration of mercury ions ([Hg 2 + 2] {\ displaystyle {\ ce {[Hg2 + ^ 2]}}}}) is low . This reduces the risk of mercury poisoning for users of mercury and other problems. SCE potential Hg 2 Cl 2 + 2 and ½ Ã Ã Ã 2 Hg (l) + 2 Cl Ã ¢, with E Hg 2 Cl 2 / Hg, Cl A 0 = + 0.27 V Ã {\ displaystyle {\ ce {Hg2Cl2 + 2e 2HG (l) + 2Cl ^ -}}, \ qquad {\ ce {}} with \ quad E _ {{\ ce {Hg2Cl2 / Hg, Cl -}}} ^ {0} = 0.27 + \ {\ ce {V}}} E 1 = E 2 SCE Hg 2 Cl 2 / Hg, Cl 2 to 0 to RT F ln a Â¡ a Cl 2 = + 0.27 Ã ¢ Â¡ an RTF ln [Cl Ã ¢]. {\ Displaystyle {\ begin {aligned} E _ {{\ frac {1} {2}} {\ ce {SCE}}} & = E _ {{\ ce {Hg2Cl2 / Hg, Cl -}}} ^ { 0} - {\ frac {RT} {2F}} \ ln a _ {{\ ce {Cl -}}} ^ {2} \\ & = + 0.27 - {\ frac {RT} {F}} \ ln [{\ ce {Cl -}}] \ end {align}}} the only variable in this equation is the activity (or concentration) of the chloride anion © .. But since the internal solution is saturated potassium chloride, this activity is set by the solubility of potassium chloride, which is: 342 g / L / 74.5513 g / mol = 4.587 M @ 20A Ã Â ° C. this gives a potential of the SCE 0.248 V vs. SHE with 20a Ã Â ° C and 0.244 V vs. SHE 25a Ã Â ° C, [1] but slightly higher when the chloride solution is less than saturated. For example, an electrolytic solution 3.5M KCl has a higher reference potential of 0.250 V vs. SHE to 25 Â ° C, while a 1 M solution has a potential of 0.283 V at the same temperature. Application The SCE is used in the measurement of pH, cyclic voltammetry and electrochemical generally aqueous. This electrode and the silver / silver chloride reference electrode work the same way. In both of the electrodes, the activity of the metal ion is set by the solubility of the metal salt. The calomel electrode contains mercury, which puts much greater risk to health than the silver metal used in the electrode Ag / AgCl. See also cyclic voltammetry standard hydrogen electrode Table of the standard potential of electrode reference electrode References ^ Sawyer, Donald T.; Sobkowiak, Andrzej; Roberts, Julian L. (1995). Electrochemistry for Chemists (2ndÃ ed.). p.Ã 192. ISBNÃ 978-0-471-59468-0. Banus MG (June 1941). "Shaping a saturated Calomel electrode". Science. 93 (2425): 601A 602. DOI: 10.1126 / science.93.2425.601-a. PMIDA 17795970. Retrieved from " " "