Tin melting experiment - lab report example

Science, Chemistry

Tin Melting Experiment

Tin Melting Experiment 3-8-11 Group 6 Summary This experiment was conducted to identify the melting point of pure Tin. In order to find that, a ceramic crucible that contained Tin was heated in the furnace up to 400C. 400C is considerably above the estimated melting point of pure Tin. To keep the sample from getting oxidized, nitrogen was introduced into the furnace while it was made sure, that no oxygen entered it. Tin’s melting point was virtually determined through its transition from solid to molten state. Tin was then shifted into a coffee can. Sand was already there in the can. A thermocouple sheath made of stainless steel was also introduced into it exactly quarter of an inch above the crucible’s base. The isolation was created with a glass fiber that decelerated the cooling process. The experiment used this time to note the data. He noticed the alteration of temperature with respect to time. Until the temperature of Tin reached 150C, temperature was noted several times at an interval of 5 seconds. 150C is essentially 10C above the freezing point of Tin. This was done so as to ensure that the thermocouple sheath does not get frozen. Once the data was completely collected, the Tin cooling curve was developed using the information of temperature versus time. Abstract This experiment was intended to find out Tin’s melting point for which, a ceramic crucible that contained Tin was heated in a furnace enough to get the temperature above Tin’s estimated melting point. The molten Tin was shifted to the coffee can filled with sand. A thermocouple sheath was placed into the molten Tin and was isolated with a glass fiber. The cooling process was slowed down due to that and the experimenter noted the data meanwhile. Finally, with the help

of data of temperature alteration with time, the Tin cooling curve was formulated. The collected data was compared with the real data noted in the periodic table to identify the extent of errors that may possibly have occurred during the experiment. Table of contents

 Introduction

Different elements exhibit different behaviors with respect to freezing and melting processes. There are elements that have a well defined freezing and melting point, while there are others that do not have a specific melting and freezing point. This experiment was conducted to determine the melting point of pure Tin from the Tin cooling curve. Experimental procedure A. Equipment used 1. Furnace. 2. Omege temperature meter. 3. Glass fiber for insulation. 4. Thermocouple sheath. 5. Plastic gloves. 6. Coffee can containing sand. 7. Ceramic crucible. B. Procedure 1. A ceramic crucible that contained Tin was heated in the furnace up to 400C. 400C is considerably above the estimated melting point of pure Tin. 2. To keep the sample from getting oxidized, nitrogen was introduced into the furnace while it was made sure, that no oxygen entered it. 3. Tin’s melting point was virtually determined through its transition from solid to molten state. 4. Tin was then

shifted into a coffee can. Sand was already there in the can. A thermocouple sheath made of stainless steel was also introduced into it exactly quarter of an inch above the crucible’s base. The isolation was created with a glass fiber that decelerated the cooling process. 5. The experiment used this time to note the data. He noticed the alteration of temperature with respect to time. Until the temperature of Tin reached 150C, temperature was noted several times at an interval of 5 seconds. 150C is essentially 10C above the freezing point of Tin. This was done so as to ensure that the thermocouple sheath does not get frozen. 6. Once the data was completely collected, the Tin cooling curve was developed using the information of temperature versus time. Results A. Table of data Time Temp Time Temp Time Temp Time Temp 0 450 110 313. 9 225 251 340 212. 7 5 427 115 309 230 249. 2 345 229. 3 10 420 120 306 235 247. 9 350 232. 8 15 411 125 303 240 245 355 232. 9 20 405 130 300. 1 245 243. 3 360 232. 9 25 398 135 296 250 241. 3 365 233 30 391 140 293. 2 255 239. 4 370 233 35 384. 1 145 290. 4 260 237. 4 375 233 40 378. 4 150 287. 3 265 236 380 233 45 371. 1 155 285 270 234. 3 385 233 50 367 160 282 275 232. 5 390 233. 1 55 361. 2 165 279. 2 280 230 395 233 60 356. 6 170 276. 6 285 229. 1 400 233 65 351. 4 175 273. 8 290 227. 4 405 233. 1 70 346 180 271. 5 295 226. 4 410 233 75 341 185 268. 5 300 224. 4 415 233 80 337 190 266. 6 305 223 420 233 85 333 195 264. 1 310 221. 4 425 233 90 328 200 261. 8 315 220 430 233 95 324. 5 205 259. 2 320 218. 5 435 233 100 320. 3 210 257. 6 325 216. 9 440 233 105 317 215 255. 3 330 215. 4 445 233 220 253. 3 335 214. 1 450 233 Time Temp Time Temp Time Temp Time Temp 455 233 575 227. 1 690 188 805 164. 9 460 233 580 224. 6 695 186. 9 810 163. 8 465 233

585 222. 1 700 185 815 163 470 233 590 220 705 184. 5 820 162. 3 475 233 595 217. 6 710 183. 3 825 161. 6 480 233 600 215. 5 715 182. 2 830 160. 7 485 233 605 214. 9 720 181. 1 835 160 490 233 610 212 725 180 840 159. 3 495 233 615 210 730 179 845 158. 4 500 232. 9 620 208 735 177 850 157. 7 505 232. 9 625 206 740 176. 8 855 156. 7 510 232. 9 630 205 745 175. 7 860 156 515 232. 8 635 203. 8 750 174. 8 865 155. 4 520 232. 8 640 201. 9 755 173. 7 870 154. 6 525 232. 7 645 200 760 173 875 153. 9 530 232. 7 650 199 765 171. 8 880 153. 4 535 232. 6 655 197. 2 770 170. 9 885 152. 7 540 232. 3 660 196 775 170 890 152. 1 545 232 665 194. 5 780 169 895 151. 3 550 231. 7 670 193. 2 785 168. 2 900 150. 7 555 231. 3 675 192 790 167. 3 905 150 560 230. 8 680 190. 8 795 166. 6 910 149. 3 565 230. 2 685 189 800 165. 5 915 148. 8 570 229. 2 B. The cooling curve Table 1 C. Class results Tuesday:(232+233+233) Wednesday: (233+233+233+233+233) Ave= 233 Percent error= ((calculated-actual)/actual)*100=. 0370 Discussion The collected data was compared with the real data noted in the periodic table to identify the extent of errors that may possibly have occurred during the experiment. The following factors are potential causes of error in the experiment: 1. Calibration of temperature meter 2. Calibration of thermo couple 3. Amount of decimal places in the temperature meter. Conclusion The minute error found is quite normal given the insufficient calibration of equipment used. In addition to that, some error might also have been introduced because of insulation. Overall, however, the collected results do not match with the real results. Therefore, the experiment can not be termed as perfect and free of error.