



INTRO TO MATERIALS

Alison Fielding

■ "To be A teacher is to be A prophet,
because you are not preparing kids for the
world you grew up in nor are you preparing
kids for the world today. You are preparing
kids for A world you cannot imagine."

■ Gordon brown, MIT dean of engineering.

MATERIALS CHANGING



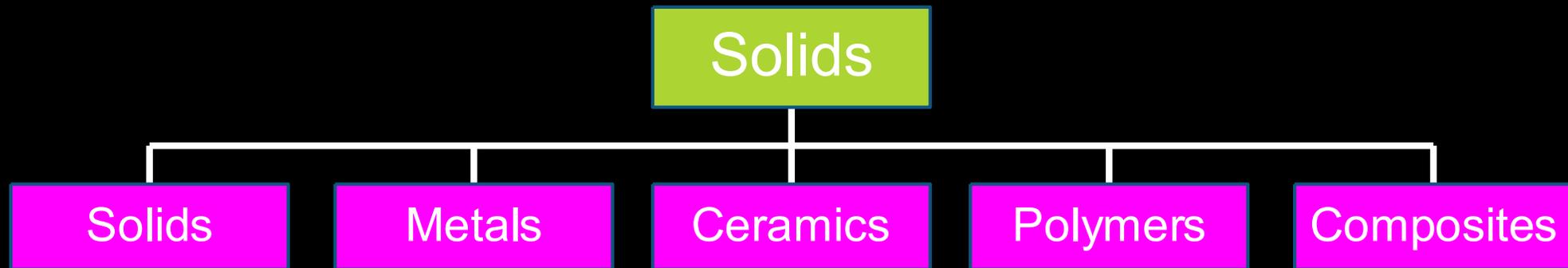
CHEMISTRY

Chemical Material



MATERIALS SCIENCE

Material Science



Periodic Table of the Elements

1 1IA 11A																	18 VIIIA 8A	
1 H Hydrogen 1.0079	2 IIA 2A											13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	2 He Helium 4.00260	
3 Li Lithium 6.941	4 Be Beryllium 9.01218											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.0064	8 O Oxygen 15.9994	9 F Fluorine 18.998403	10 Ne Neon 20.1797	
11 Na Sodium 22.989769	12 Mg Magnesium 24.305	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	VIII 8		9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	13 Al Aluminum 26.981539	14 Si Silicon 28.0855	15 P Phosphorus 30.973762	16 S Sulfur 32.06	17 Cl Chlorine 35.4527	18 Ar Argon 39.948
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.95591	22 Ti Titanium 47.88	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.9332	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenic 74.9216	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80	
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.94	43 Tc Technetium 98.9062	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.9055	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.90447	54 Xe Xenon 131.29	
55 Cs Cesium 132.90545	56 Ba Barium 137.327	57-71 Lanthanide Series		72 Hf Hafnium 178.49	73 Ta Tantalum 180.9479	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.96655	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98037	84 Po Polonium [209]	85 At Astatine 209	86 Rn Radon 222.0176
87 Fr Francium 223	88 Ra Radium 226	89-103 Actinide Series		104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [265]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [285]	111 Rg Roentgenium [272]	112 Cn Copernicium [285]	113 Nh Nihonium [284]	114 Fl Flerovium [289]	115 Uu Ununpentium [288]	116 Lv Livermorium [293]	117 Ts Tennessine [294]	118 Uuo Ununoctium [294]

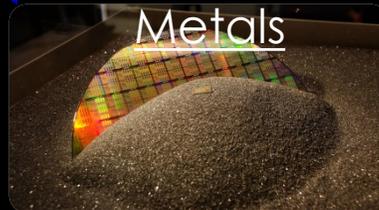
Alkali/Alkaline Metals



Non-Metals



Semi-Metals



Transition Metals



Basic Metals



MATERIAL SCIENCE IS ABOUT...

Composition

Structure

Performance

Processing

- Understanding and developing a greater appreciation for the importance of the variety of materials in our lives
- Studying how materials can be changed or manipulated
- The search for new materials

DEFINITION OF MATERIALS SCIENCE

- Understanding and using the materials in our daily lives
- Study of the materials in our lives and how they can be changed or manipulated
- Describes the understanding of the solids that emerges from the combined viewpoints of chemistry, physics, and engineering
- Involves the generation and application of knowledge relating the *composition, structure and processing* of materials to their *properties and uses*

MATERIALS I.D. LAB

- **Free write – everything you know about the following categories:**
 - **Metal**
 - **Ceramic/Glass**
 - **Polymer**
 - **Composite**
- **Pick one item from the box**
 - **Classify it into one of the categories**
 - **Give your reasoning**
 - **Give your % confidence level**



Metals

Ceramics





Polymers



Composites

Other



↑
Silicon =
semiconductor



Light bulb is
an assembly

MATERIALS ID LAB PART II

- If you were to take apart a pen, predict how many different pieces you would find. What kind of materials do you think would be used?
- Now take the pen apart and determine what materials were used in the making of this item.
- **DO NOT DESTROY WHEN TAKING APART!!!**

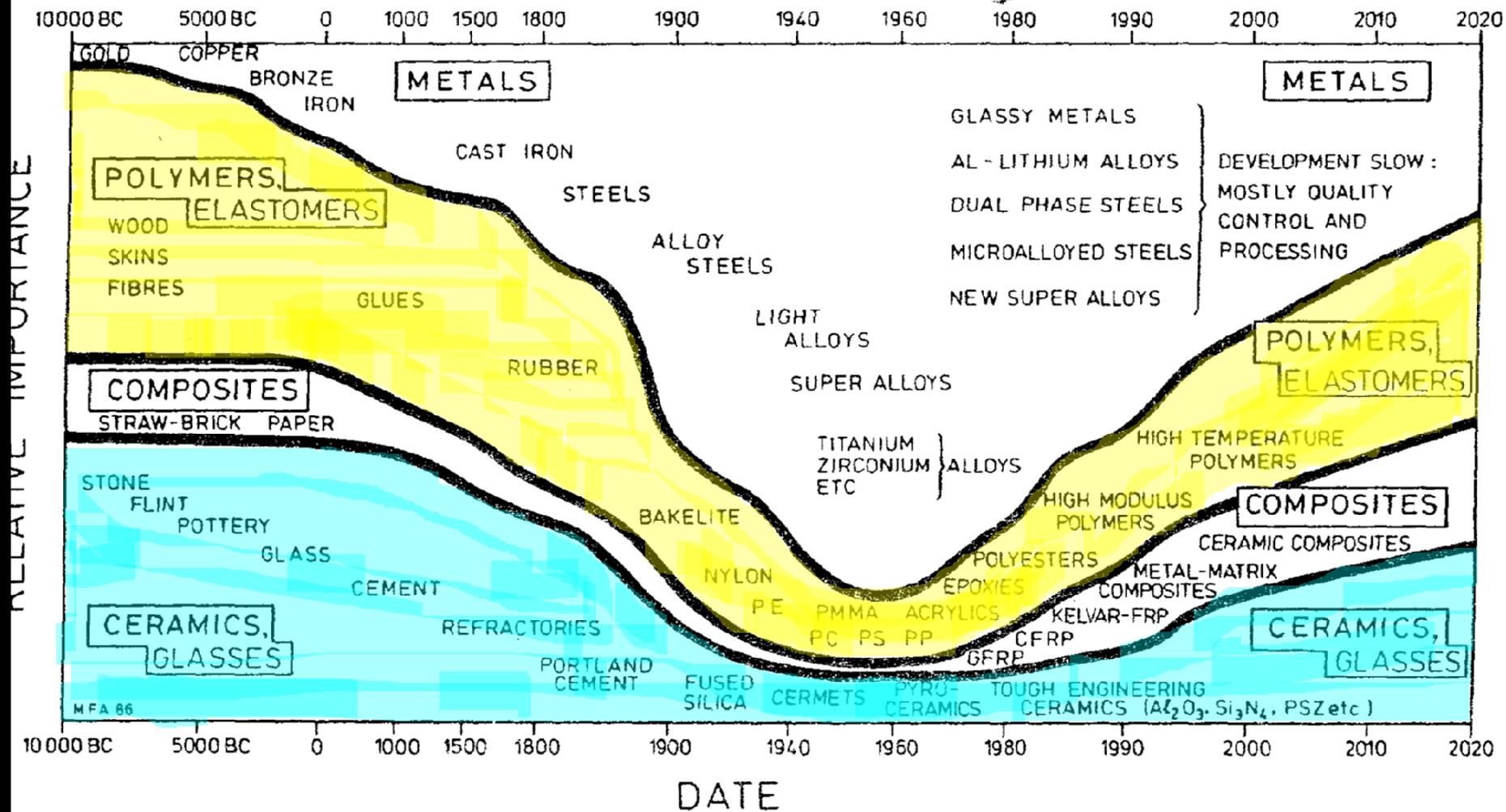


CONNECTION TO THE MATERIALS ID ACTIVITY

- **History Free-Write**

- Which category has been used by mankind the longest?
- Why that particular one?
- What did they use it for?

Stuff: The Materials the World is Made Of
 by Ivan Amato
 ISBN: 0-380-73153-3

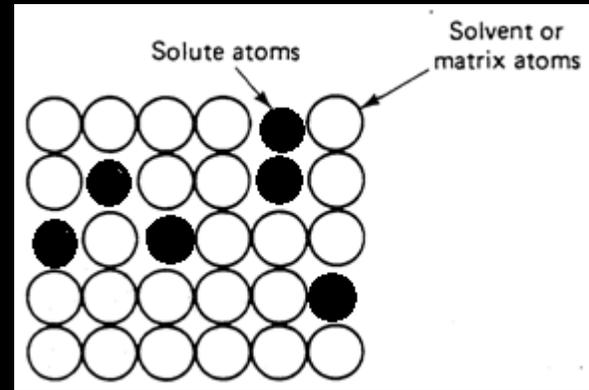


HISTORY AND MATERIALS

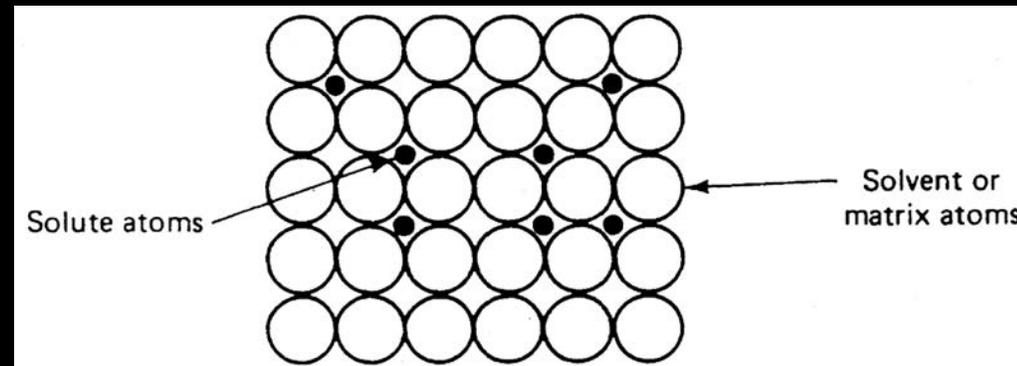
- Stone Age
- Bronze Age
- Iron Age
- What age are we in now?

POINT DEFECTS

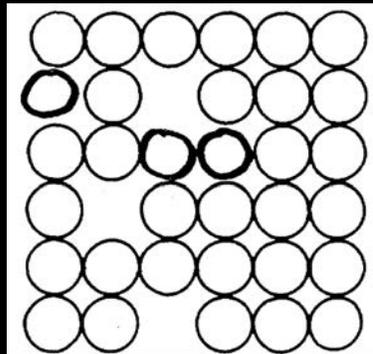
■ Substitutional



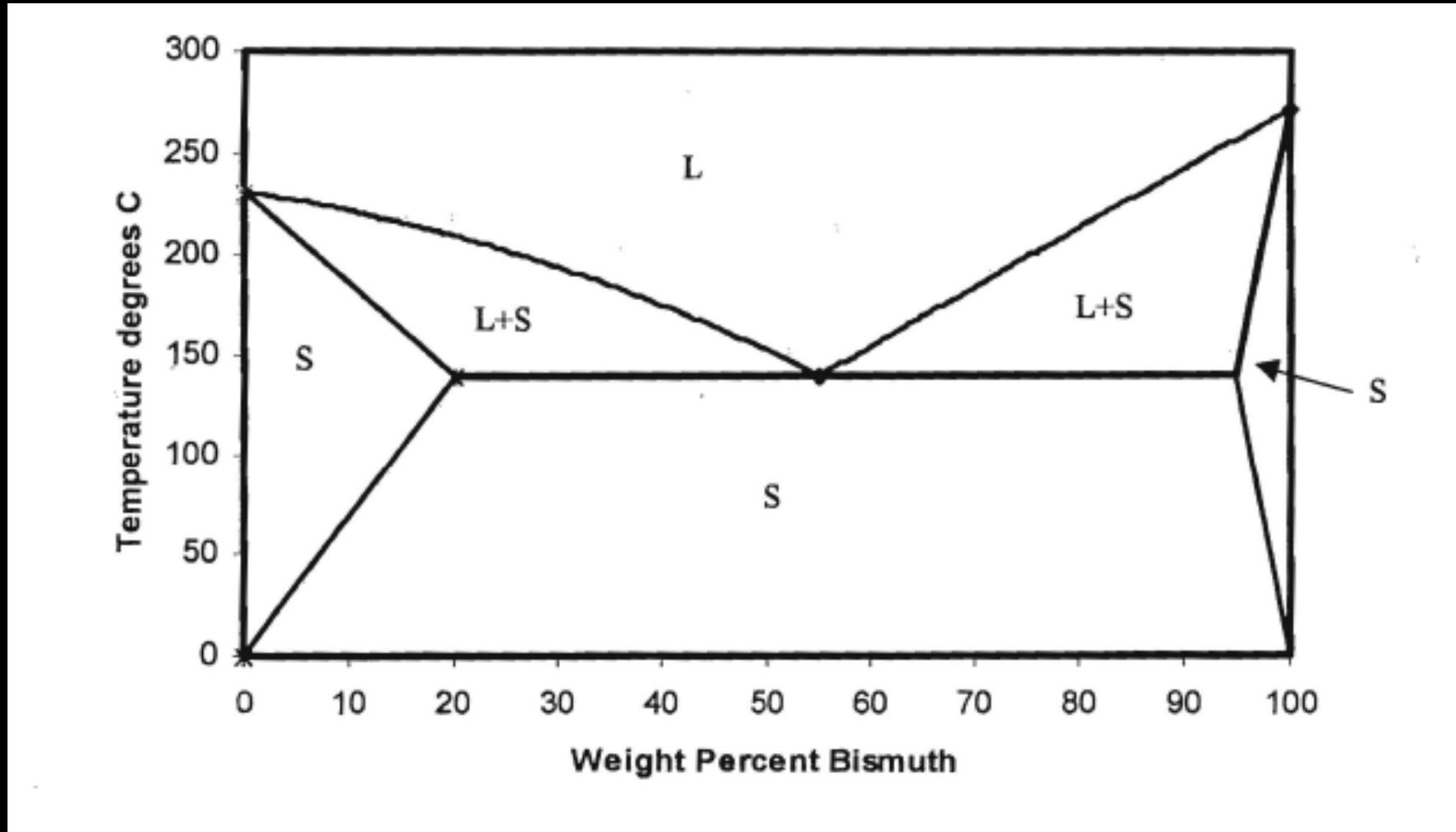
■ Interstitial

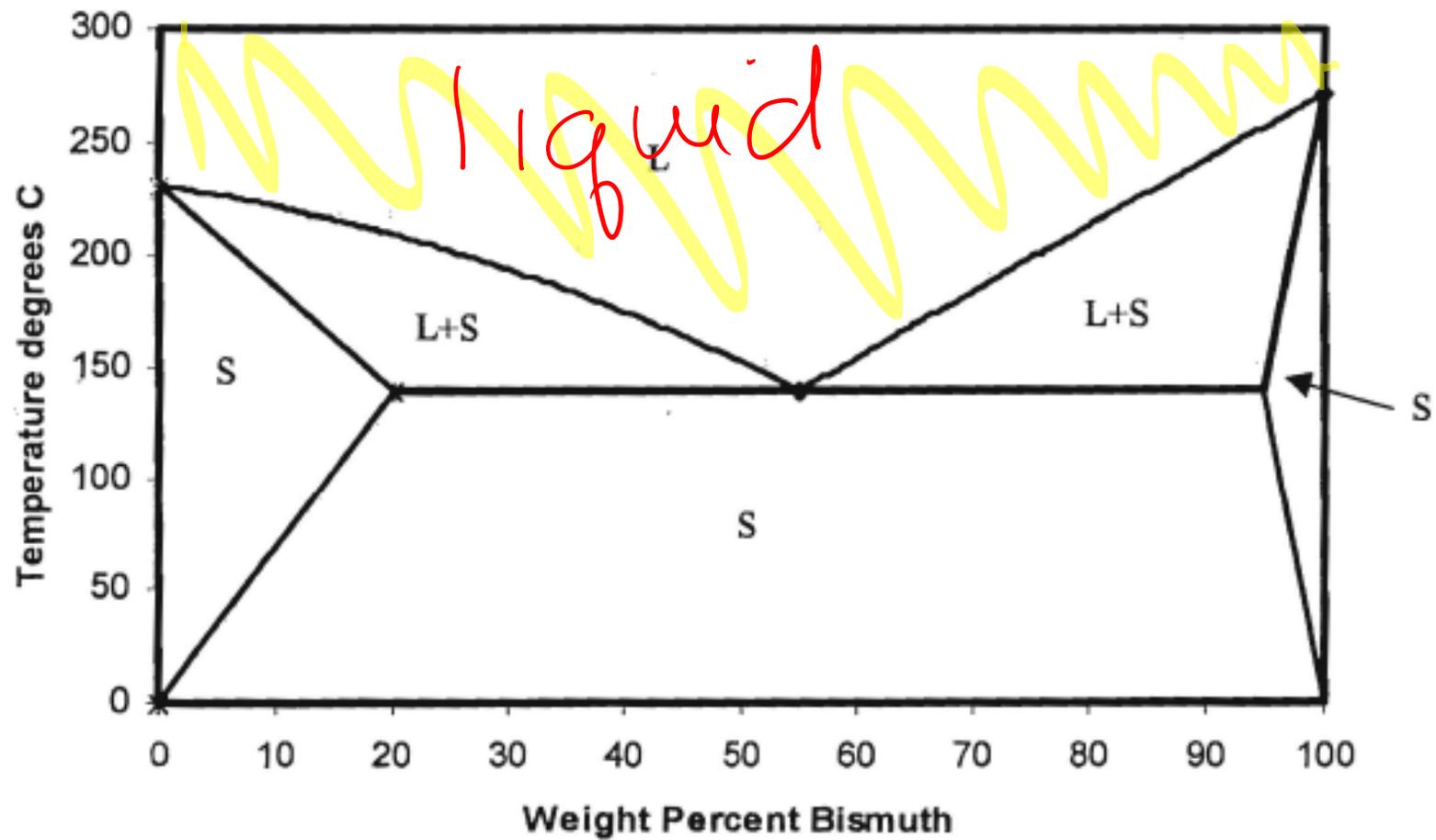


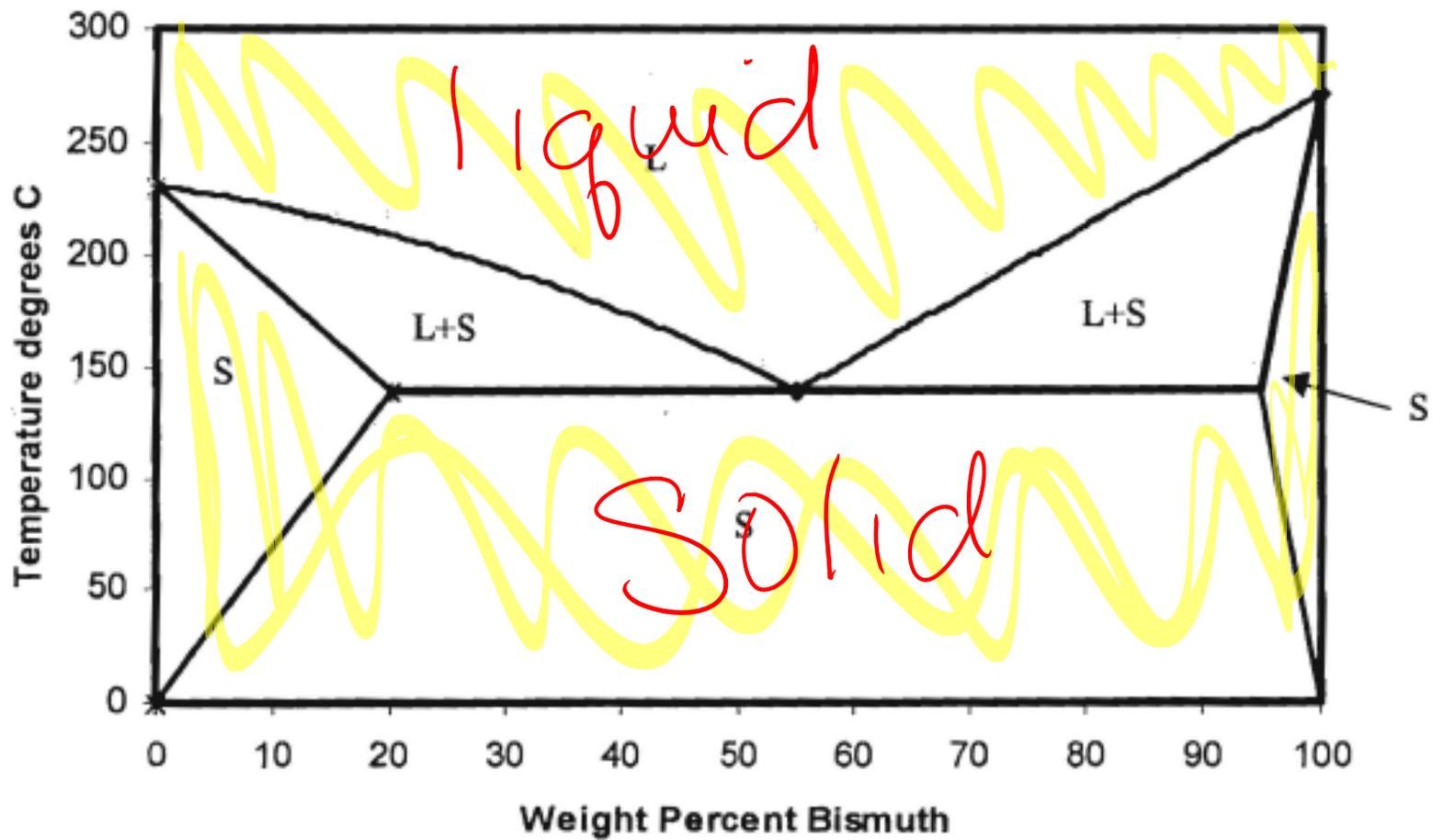
■ Vacancy

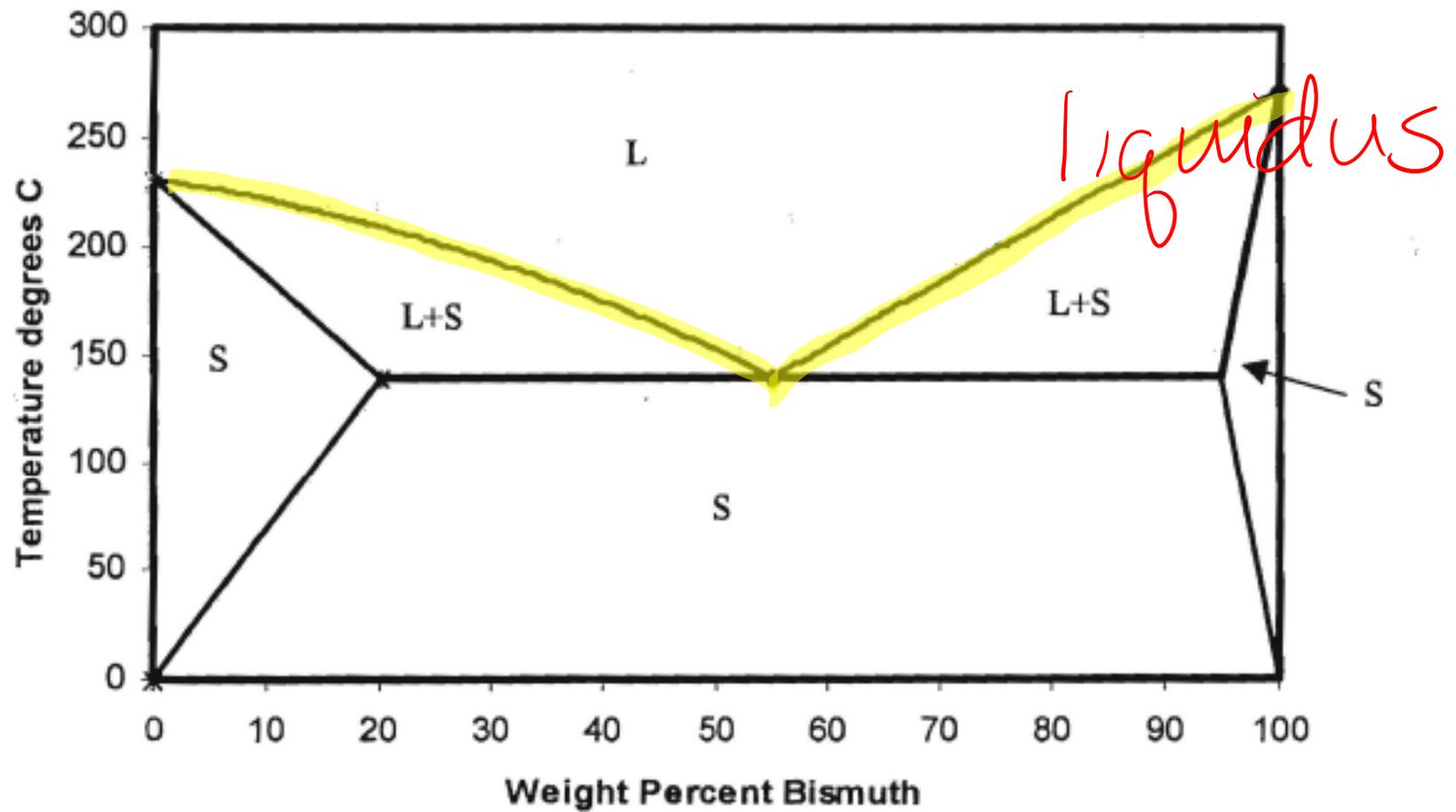


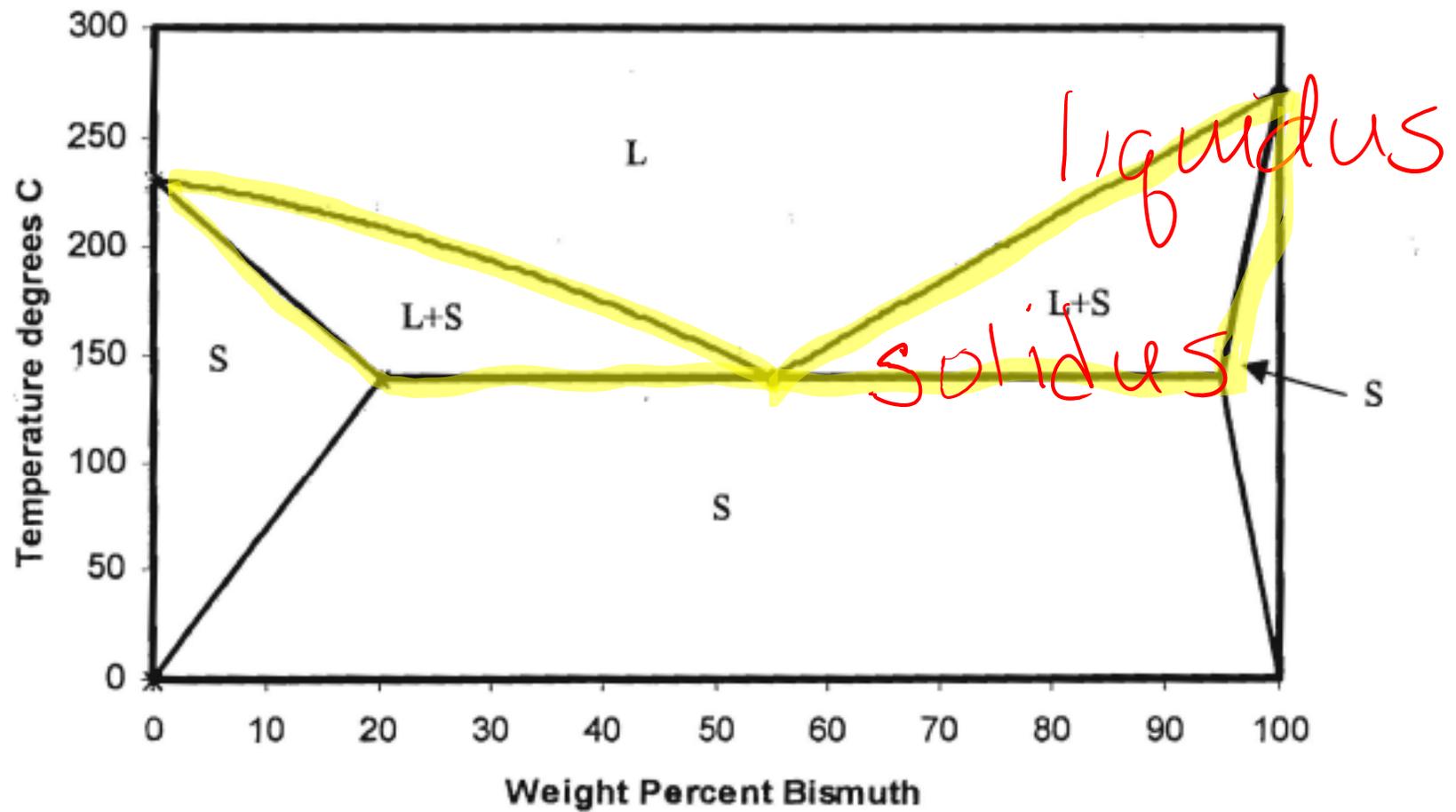
BISMUTH/TIN –

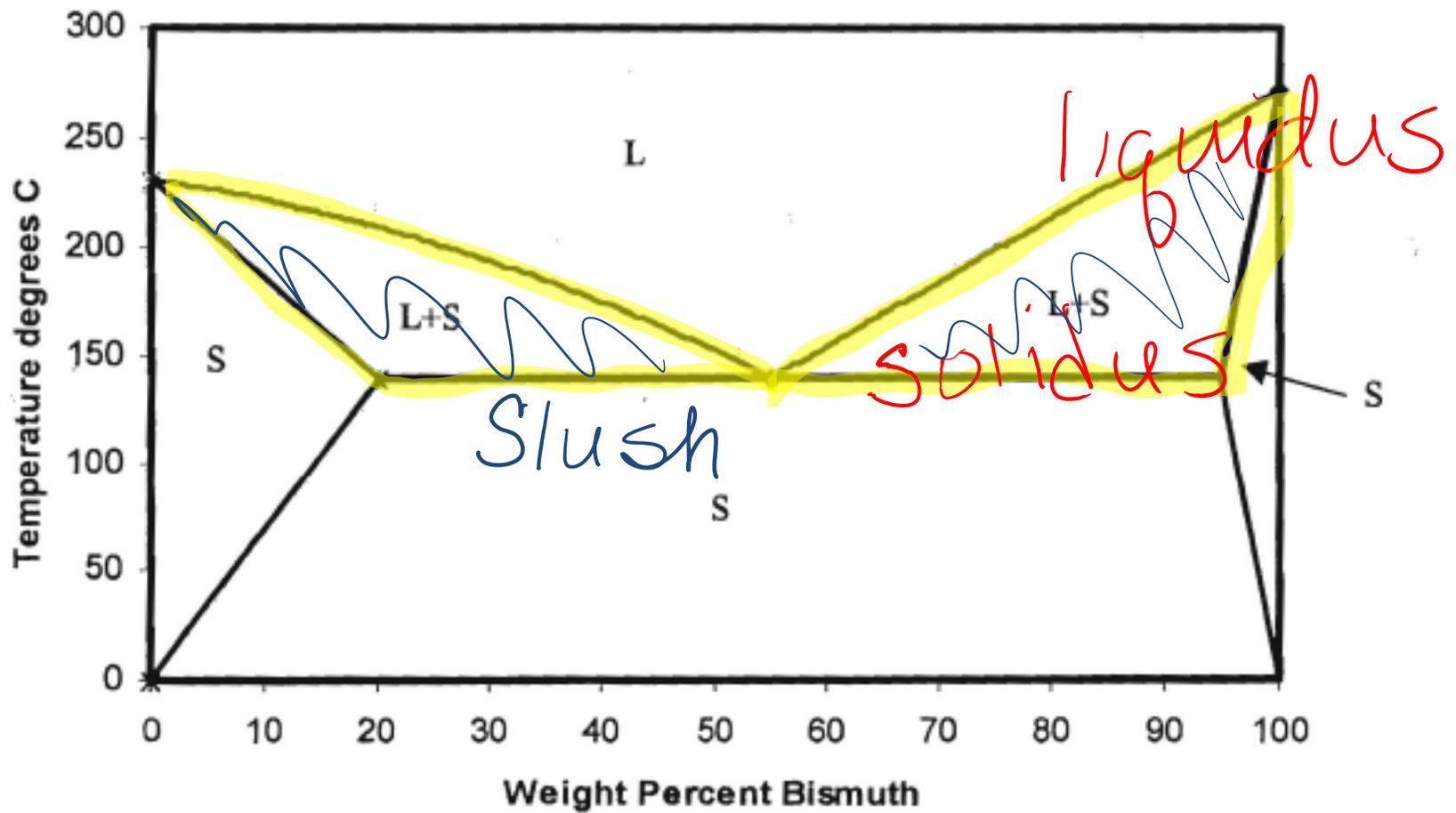


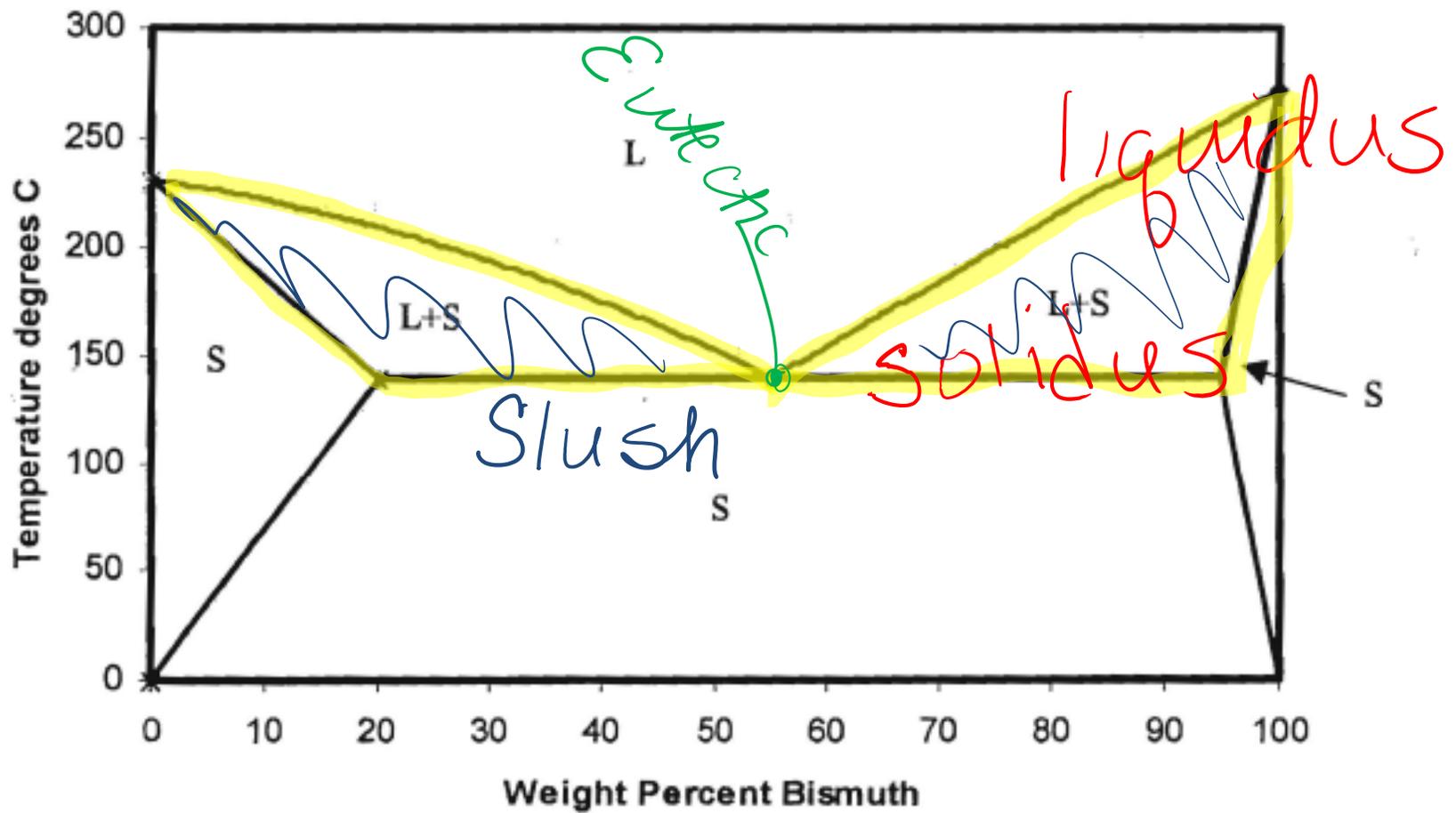


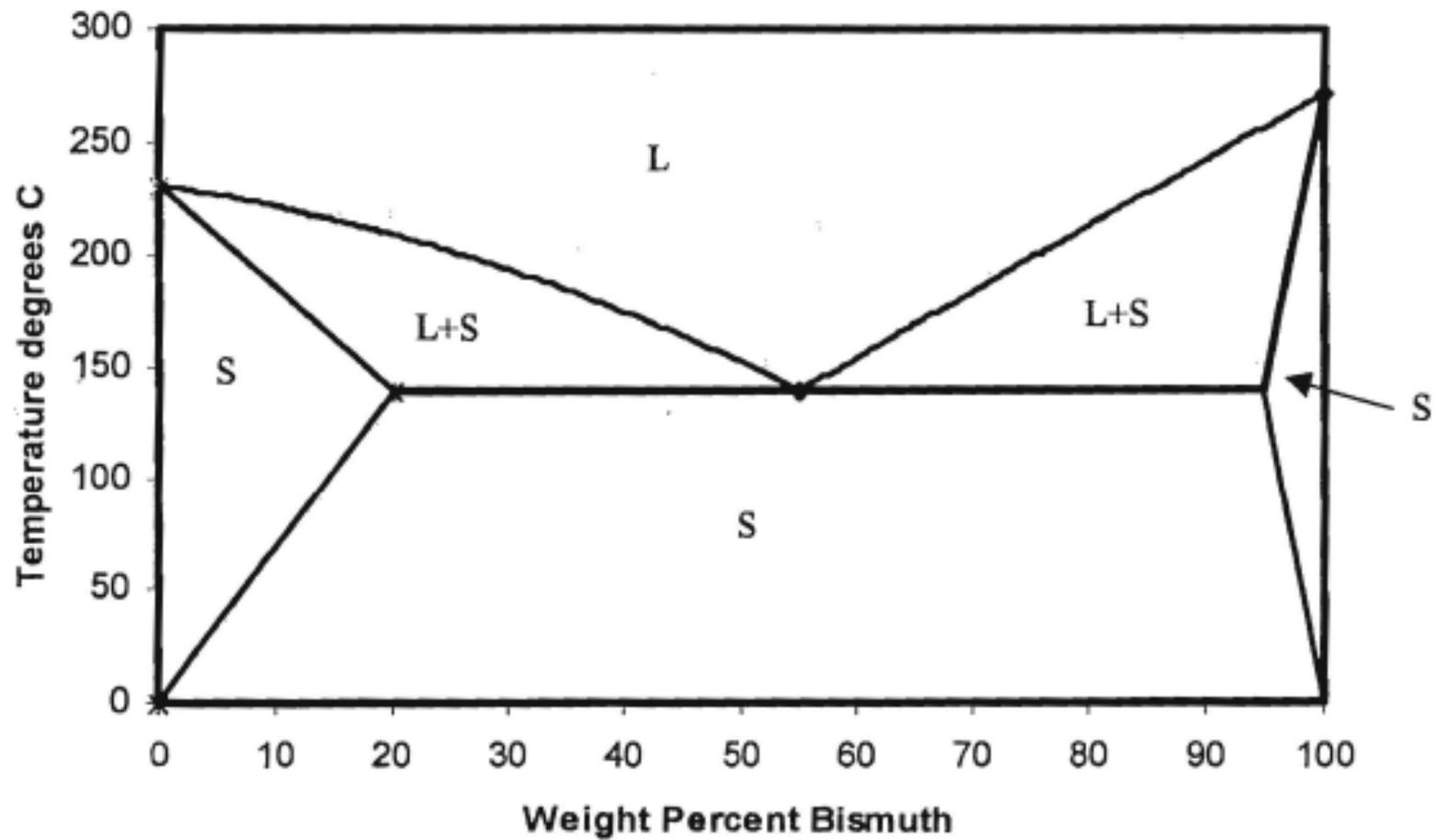












LEAD/TIN

