3.091 OCW Scholar

Self-Assessment Exam
Amorphous Materials

Write your answers on these pages.

State your assumptions and show calculations that support your conclusions.

RESOURCES PERMITTED: PERIODIC TABLE OF THE ELEMENTS, TABLE OF CONSTANTS, AN AID SHEET (ONE PAGE 8½" × 11"), AND A CALCULATOR.

NO BOOKS OR OTHER NOTES ALLOWED.

Exam 3, Problem #2

(a) For a given alloy composition, explain why the yield strength of the amorphous form (metallic glass) is greater than that of the crystalline form.

Exam 3, Problem #6

(a) Classify each of the constituents of a glass with the composition 15% K_2O – 70% B_2O_3 – 15% SiO_2 as (1) a network former, (2) a network modifier, or (3) an intermediate, and explain the role each constituent plays in giving the glass its set of properties.

(b) The glass described in part (a) is to be surface strengthened by ion exchange. To this end, two identical specimens approximately the shape of credit cards are soaked for the same length of time at 850°C: one specimen in NaCl; and one specimen in KCl. How do you expect the yield strength of each specimen to change? Explain.

1. NaCl

2. KCl

3.091SC Introduction to Solid State Chemistry

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