347k Review for Final Exam
Spring, 2001
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OLD FINAL EXAM QUESTIONS, BY CATEGORY

GEM SYNTHESIS

1) What differentiates a synthetic gem from an imitation gem from a natural gem?

2) There exists, for some synthetic gems, a 100-fold difference in price for nearly identically appearing goods. One can, for example, pay a few dollars a carat or several hundred dollars a carat for a synthetic ruby. These price differences are not related to differences in size, color, clarity, weight, or any measurable differences in mineralogical properties. Price differences exist at the wholesale level and presumably are not an artifact of arbitrary pricing.

A) Knowing a little about gem synthesis and using ruby as an example, what are some reasons for these price differences?

B) What, if any, reason(s) is there to pay more for one type of synthetic ruby versus another?

3) Are there any sound reasons to prefer, and thus willingly pay more for, a more expensive type of synthetic gem? If so, list them.

4) Why are there such great differences in price among synthetic gems? Why, for example, does some synthetic ruby sell for over $200/ct and some for less that $1/ct? Why, in comparison, is synthetic quartz so cheap? (Please don't just tell me it cost more or less to make them, tell me something about the processes that make them cheap or expensive.)

5) The argument is occasionally made that the laboratory techniques used to synthesize gem materials are essentially the same as the processes that form gems in nature, and thus that synthetic gems are in no way inferior to their natural counterparts. This statement is sometimes followed by the assertion: "In fact, by carefully controlling conditions in the laboratory, it is possible to make gems that are more perfect than naturals so that synthetic gems are really superior to natural gems".

What, if anything, is wrong with these statements?

6) Two gem synthesis techniques are presently in use for the manufacture of corundum and emerald. What are they, how do they differ, and how are differences in the two processes manifest in the gemstones cut from these synthetic materials? Also, are these materials really the same as their natural counterparts?

ENHANCEMENTS/SYNTHETICS/IMMATIONS

1) What does the term "enhancement" mean in the gem trade? List three types of enhancement processes and 5 gem minerals to which they are applied.

2) My experience with the general public tells me that most people think of gemstones in terms of two broad catagories: "fakes" and "the real thing". Considering what you have learned in this class, what are some problems with classifying all gems in terms of these two categories? To get started, consider comparisons with the terms "natural", "synthetic", "enhanced" and "imitation".

3) List 4 natural gem materials whose appearance is commonly enhanced by some form of treatment and for each one give: a) the treatment technique; b) whether the enhancement is permanent; c) the end result of the enhancement; and d) if the enhancement can be detected and if so, the feature(s) that distinguish it.

4) In a recent ad, I ran across the phrase “some of our gemstones are processed to enhance their appearance”. The same ad also says “see us for the finest, genuine, laboratory-created gems”. a) What are these two phrases referring to? b) Give three (total of 6) examples of gems that might qualify under each of these statements. c) What, if any, affect does "processing" or "laboratory-creation" have on the value of such gems as compared to their "unprocessed" or natural counterparts?

5) "Enhancement" is a euphemism that is widely used in the gem business, as are terms like "Laboratory-Created", "Color Corrected", "Reconstructed", and "Stabilized". In plain English, what do these words convey about the material(s) they are applied to?

6) What, if any, treatments are used to enhance the clarity and/or color of the following gem materials, and what is the result of the treatment?

a) Diamond

b) Red garnet

c) Pearl

d) Emerald

e) Ruby

f) Aquamarine

g) Chrome tourmaline

h) Blue topaz

FACET ROUGH AND CUTTING

1) List 2 gem minerals that when purchased as rough deserve special consideration prior to cutting; what needs to be considered and how can it be dealt with in order to yield the most attractive and valuable stones?

2) One of the most important consideration to a professional (and amateur!) lapidary when purchasing a piece of gem rough is the waste-to-yield ratio; what is the biggest, finest gem that a piece of rough will yield? In trying to answer this question, what attributes of the material or the rough must a cutter consider, and why?

ORIGIN AND SOURCE

1) List the country or countries that are the primary source(s) for: 1) diamond; 2) topaz; 3) sapphire; 4) ruby; 5) emerald. For 1 pt. Extra credit for each, give the type(s) of deposit each are found in.

2) List the country or countries that are the primary source(s) for: 1) diamond; 2) emerald; 3) sapphire; 4) ruby; 5) pearls, and the type of deposit they are found in. For a few extra points, include in your answer the continent and closest ocean, sea or gulf for each country you list.

3) Several of the gems we discussed this semester originate in pegmatites or high temperature hydrothermal veins. If you were interesting in prospecting for them how would you go about doing so? Specifically, what gem minerals (give at least 4) are you looking for, and what types of rocks are most likely to contain these 2 kinds of deposits? If you're stuck, think about the processes involved and the conditions required.

4) Ruby and emerald form by very different geologic processes and are consequently found in different geologic settings. What are the formative processes responsible for each, and where are they found?

5) What factors account for the rarity of most gem minerals?

OPAL

1) What are the attributes that define the quality of an opal and how are they reflected in pricing? What potential pitfalls should one be aware of when buying an opal? Finally, why are opals only found in areas with arid climates? Fall 91

2) Opal differs from most of the gem minerals we discussed this semester in several important respects. What are some of these differences?

3) A seemingly remarkable investment opportunity in an opal mine is being offered. The mine is said to be in a newly discovery deposit in limestones in the rain forests of Costa Rica. You are asked your opinion of this as an investment prospect. What is your answer and why?

4) Where does most of the world's precious opal come from? Why are opal deposits restricted in occurrence to arid regions? What are the most prized body color and colors in the play-of-color for opal?

QUARTZ

1) What is the difference between A) rock crystal/amethyst/citrine and B) chalcedony? List and describe the appearance of 5 varieties of chalcedony.

2) Mineralogists and gemologists recognize two basic kinds of quartz. Within these two categories are numerous gem varieties. What are the two basic categories, and how are they different? Give the name and definition of 4 gem varieties in each category.

CORUNDUM

1) What should one consider when buying a ruby gem?

2) As a person knowledgeable in gems, you have been hired by a client to purchase the "finest" $10,000 sapphire you can find. What does "finest" mean? What size stone might you be looking for at this price?

3) Sapphires range in price from a few dollars per carat to as much as $8000 or more per carat. a) If it's all sapphire, why the extremely large range in price? b) Give examples of sapphire that would command the greatest and lowest price per carat.

4) What are the names of the finest varieties (i.e. most expensive/carat) of Ruby, Sapphire, Topaz, Opal and Garnet? What do these names mean with regard to appearance and/or source of each of these minerals?

5) What are meant by the terms "Burma Ruby", "Thai Ruby" and "Ceylon Ruby"?

BERYL

1) Beryl and garnet are mineral *groups* that contain several gem varieties. a) What are the common gem varieties in each of these groups and how do they differ? b) Where are they found? c) Of the varieties you've listed which are the most highly valued?

GARNET

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DIAMOND

1) A diamond certificate states the following:

Color - E
Clarity - VVS1
Cut - 6.5 mm Standard Round Brilliant
Table % = 55
Depth % = 63
Girdle thin
Polish good
Weight - 0.99 carats

What does this diamond look like? Comment on the cut and/or any other aspect of this stone that might detract from its value. Is this a diamond that would command a price near the top of the range for its size? Why or why not?

PEARL

1) What are cultured pearls and where do they come from? How are they different from natural pearls?

MINERAL ID

1) A friend has a ring that contains a round, yellow gemstone. She says the stone weighs about 5 carats and tells you "the ring costs a lot, but I can't remember what the yellow gemstone is". Knowing you have taken this class, she asks you to identify it. You have no gem testing equipment to do the standard tests (e.g. R.I., isotropy, S.G.), so you tell her you won't be able to give her a definite answer but are willing to make a few educated guesses.

What questions might you ask, what observations about the ring and stone would be useful, and what are some possibilities for the identity of the yellow gem? Explain your reasoning.

2) What is (are) the visual difference(s) between:

j) Nephrite and Jadeite

a) Imperial Topaz and yellow Topaz

b) Carnelian and Onyx

c) Opal doublet and Opal triplet

d) Padparadscha and Kashmir sapphire

e) Green Beryl and Emerald

f) Natural pearl and Cultured pearl

g) Chrome tourmaline and bicolor tourmaline

h) Synthetic star sapphire and natural star sapphire

i) Rhodolite and Tsavorite

j) Natural blue topaz and irradiated/heated blue topaz

k) "Burma" ruby and "Thai" ruby

b) Cherry Opal and Boulder Opal

c) Nucleated Cultured Pearl and Freshwater (Non-nucleated) Cultured Pearl

e) Synthetic Amethyst and Natural Amethyst

f) Chrome Tourmaline and Tsavorite

g) Almandine and Morganite

h) Turquoise and Lapis Lazuli

i) Alexandrite and Red Spinel

a) Bloodstone and Chrysoprase

b) Cherry Opal and Crystal Opal

c) Watermelon tourmaline and bicolored tourmaline

f) Chrome Tourmaline and Rock Crystal

g) Aquamarine and blue topaz

h) Colorless diamond and colorless quartz

i) “Ceylon” and “Thai” ruby

3) List the technique(s) used to distinguish:

a) Natural pearl from nucleated cultured pearl

b) Flame fusion synthetic ruby from natural ruby

c) Ruby from garnet

d) Diamond from cubic zirconia

e) Topaz from citrine

f) Synthetic amethyst from natural amethyst

g) Emerald from green glass

h) Opal from synthetic opal

i) Emerald from synthetic emerald

j) Natural blue topaz from irradiated/heated blue topaz

4) Knowing you have recently taken a course in gems and gem minerals at the big U, a relative says that they like green gemstones, want to buy one, have about $500 to spend and asks your advice on what to purchase. What advice can you offer about the kind of gem(s) they might consider? Your answer should list the various green gem materials we discussed, any attributes that are special to the materials, and what they should look for in selecting the right gemstone.