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Synthesis of CO2 absorbent using HEPZ (1-(2hydroxyethyl)piperazine) with APTES (3-Aminopropyltriethoxysilane) or PEI(Polyethylenimine) and reshaped by Fumed Silica

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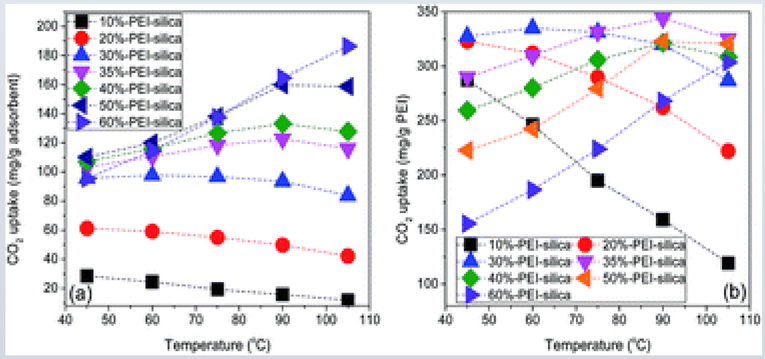
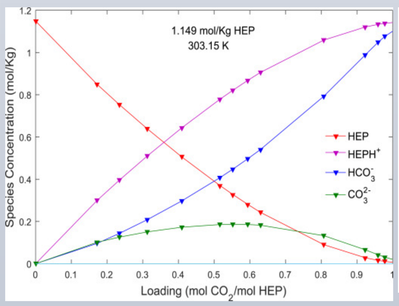
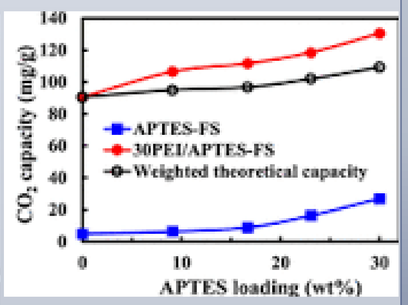
INTRODUCTION

As the rapidly development on industry, increasing of greenhouse gas, especially the carbon dioxide emission, has severe impact on our environment in few decades.[1] There are few ways to remove CO2 in our environment, including from planting trees, BECCS(Bioenergy with carbon capture and storage) to sorbent materials, but here we focus on "Molecular Basket" sorbent. From previous paper, we can see the effectiveness of HEPZ, PEI, and APTES in CO2 capture. [2][3][4]





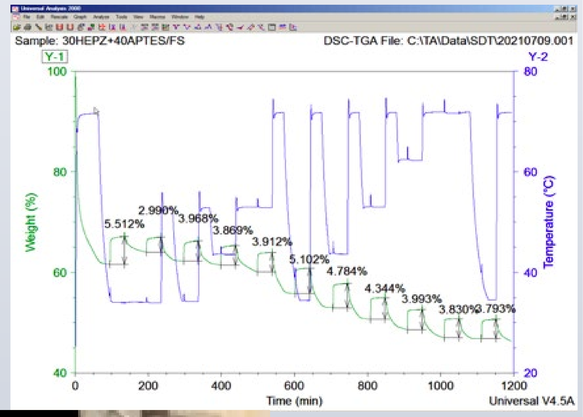


OBJECTIVE

To know the best weight percentage and temperature that can enhance the CO2 capture by HEPZ (1-(2-Hydroxyethyl)piperazine) mixed with APTES (3-Aminopropyltriethoxysilane) or PEI (Polyethylenimine) and reshaped by fumed silica. We use TGA and covert them in to charts to see how well it absorb CO2

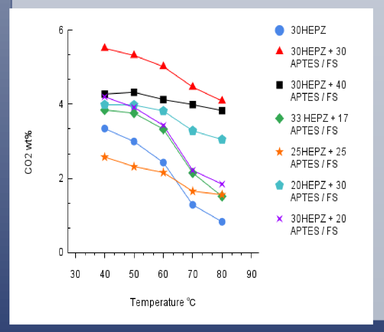
MATERIAL & METHOD

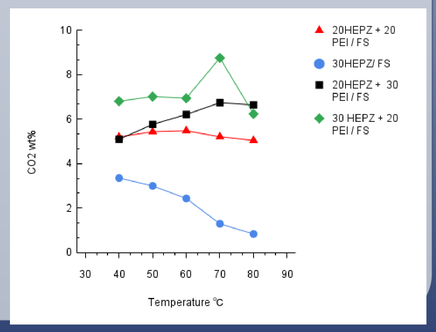
In this experiment, we first need to prepare the sample in different percentage (in wt%),; for example: 20 HEPZ + 20 APTES/ FS. We combine calculated the amount of x grams HEPZS and y grams of APTES with z grams of FS, those numbers are in relative ratio of among; for example; we have 20 HEPZ + 30 APTES/F, so the grams of the solvent should be 2.0 grams of HEPZ + 3.0 grams of APTES and 5.0g FS. And then we mix the calculated HEPZ and APTES in 10 grams of deionized water with vigorous stir in a 250ml beaker. We put FS in, but still vigorous stir until it is dry. When it is dry, we can take it out to do the TGA, the result look like this:



RESULT

The samples are white powders except the only one ye llow powder to gel-like sample: 30 HEPZ 40APTES/ FS. And these are the chart collected from TGA.





CONCLUSION

Holding the HEPZ at 30 wt%, we can see that if added in APTES, the more wt% of APTE the higher the material absorb CO2, but slightly decline when APTES is 40 wt%. And for holding the APTES not change, which is the result from 30/ 30 and 20/ 30, it still shows that the higher the HEPZ is, the CO2 absorb more. However, we can see the 25/25 lower than everyone, and if we change the HEPZ and APTES in convertibly(one up one down 33/17 and 20/ 30) the CO2 absorb more.

As for HEPZ and PEI, it is similar to HEPZ and APTES. We see that if we hold one of them as constant and higher the other one up, the CO2 would go up.

REFERENCE

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