The microphone output voltage is indicated on the measuring Amplifier Type 2606 which is made selective by the addition of the Heterodyne Slave Filter type 2020. Of The filter is tuned automatically from the Generator 1023 to follow the frequency of this. The meter scales of the Frequency Analyzer and Measuring Amplifiers enable the absorption coefficient (α) to be read directly.

3. Results and Discussions

FT-IR spectroscopy is a well-known technique that is easy to operate and relatively fast when compared with the other techniques for chemical analyses. For this reason, it was used in this investigation for detecting the chemical composition of the fabricated composites. The chosen composite (has highest α) that measured by FTIR is consists of: $MgSO_4$, Paper Waste, Cement and PVAc.

The infrared spectrum of FTIR for $MgSO_4$ has four dominant peaks of absorbance in the frequencies area:

3500 Hz – 3200 Hz: O-H stretch vibration
2500 Hz – 2000 Hz: S-H stretch vibration
1750 Hz – 1500 Hz: C=O stretch vibration
1250 Hz – 1000 Hz: C=N stretch vibration

Paper Waste has two dominant peaks of absorbance in the frequencies area:

3500 Hz – 3200 Hz: O-H stretch vibration
1750 Hz – 1600 Hz: C=O stretch vibration

Cement has four dominant peaks of absorbance in the frequencies area:

3700 Hz – 3500 Hz: N-H stretch vibration

1500 Hz – 1200 Hz: C-H bend vibration
1200 Hz – 1100 Hz: C=S vibration
1000 Hz – 1850 Hz: C-H & CH_2 vibration

Polyvinyl Acetate was measured two times; one for absorbance and another for transmittance, both are equals. It has five dominant peaks of absorbance in the frequencies area:

3500 Hz – 3100 Hz: O-H stretch vibration
1750 Hz – 1700 Hz: C=O stretch vibration
1700 Hz – 1550 Hz: C-C stretch vibration
1300 Hz – 1100 Hz: CH bending vibration
1050 Hz – 1000 Hz: CH_2 twisting vibration

There are more complete peaks of transmittance for PVAc:

3338, 61/cm: O-H stretch vibration
1731, 43/cm: C=O stretch vibration
1641, 38/cm: C-C stretch vibration
1433, 34/cm: CH_2 asymmetric vibration
1371, 80/cm: CH_3 asymmetric vibration
1234, 90/cm: CH bending vibration
1209, 70/cm: C-O vibration
1020, 63/cm: CH_2 twisting vibration
945, 27/cm: CH_3 wagging vibration
603, 70/cm: C-H bending vibration

The results of sound absorption coefficient of each sample are shown in the following description:

Composite-1: the maximum absorption coefficient is 0, 38 in the frequency range 350 Hz – 450 Hz. Composite-2: the maximum absorption coefficient is 0, 47 in the frequency range 400 Hz – 720 Hz. Composite-3: the maximum absorption coefficient is 0, 41 in the frequency range 350 Hz – 800 Hz.

Composite-4: the maximum absorption coefficient is 0, 37 in the frequency range 350 Hz – 800 Hz. Composite-5: the maximum absorption coefficient is 0, 29 in the frequency range 350 Hz – 600 Hz. Composite-6: the maximum absorption coefficient is 0, 52 in the frequency range 350 Hz – 800 Hz.

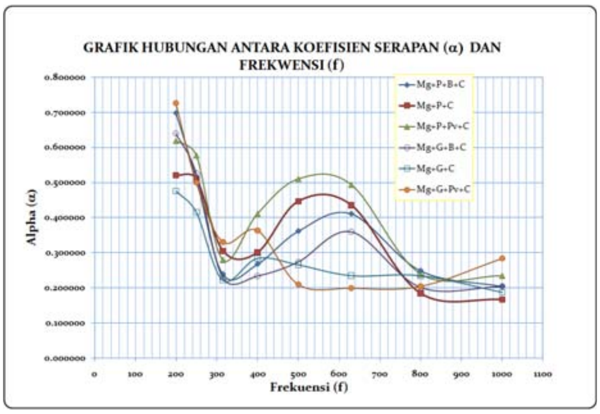

Figure 8: The graph of absorption coeffisien (α) versus frequency of 6 tested composites

The highest sound absorption coefficient among six tested composites is the composite-6 that has α = 0, 52.

It is interesting that three composites which each contains paper waste component have higher sound absorption coefficient compared to the three compo-sites which each contains glass wool component in the frequency area between 350 Hz – 800 Hz.

4. Conclusion

The fabricated composites that consists of $MgSO_4$, Office Paper Waste, Polyvinyl Acetate, and Cement has highest Sound Absorption Coefficient compared to the other tested composites, and all tested composites contain paper waste have better ability in absorbing noise compared to all composites contain glass wool in the frequency range between 350 Hz – 800 Hz. The combination of $MgSO_4$ and office paper waste for fabricating composite as noise absorber is interesting because it exhibit promising properties in absorbing noise. It has been noted that one of the most important factor in acoustic properties of composite is the type of binders. Different binders perform different abilities in absorbing noise and in strengthening composite. The use of binder instead PVAc is needed in the future for improving this investigation.

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