INTRODUCTION
As compared to other routes for drug administration, oral route is the most preferred as it is much convenient. Therefore more research has been focused on controlled release oral drug delivery systems, but the important difficulty is associated in designing the controlled delivery systems for better absorption and enhanced bioavailability. In case of conventional oral delivery systems the dosage forms passes through the stomach and small intestine within very short period of time decreasing bioavailability and to increase bioavailability dosage forms have to stay inside the stomach or upper intestine for desired period of time so that entire drug can be released from the dosage forms. Gastro retentive systems retain the dosage forms for several hours inside the stomach increasing gastric residence time of drugs. Prolonged gastric retention improves bioavailability, reduces drug waste, and improves solubility for drugs that are less soluble in a high pH environment. The controlled gastric retention solid dosage forms have been developed by means of various mechanisms such as of mucoadhesion,1 flotation,2 sedimentation,3 expansion,4 modified shape systems,5 or by the simultaneous administration of pharmaceutical agents,6 that delay gastric emptying. Among the above different techniques Floating drug delivery systems (FDDS)7 are novel drug delivery systems. Where the solid dosage forms remain buoyant condition on the gastric fluid and release the drug slowly and gastric residence time can be enhanced significantly. This is a very simple but highly innovative concept. More over it has several advantages over other gastro retentive delivery systems. Sitagliptin phosphate is a drug used to treat diabetes mellitus. It is incompletely absorbed from the gastrointestinal tract and has an oral bioavailability of only 85% while remaining drug is excreted unchanged in feces. This is because of poor absorption in lower gastrointestinal tract. Therefore, the formulation of Sitagliptin phosphate as a gastro-retentive floating drug delivery system was thought to be beneficial, to improve bioavailability.

MATERIALS &METHODS:
Sitagliptin phosphate (Gifted sample from Glenmark Pharm, India), HPMC, Carbopol, Sodium bicarbonate, MCC, Citric acid and other chemicals of analytical grade.

Methodology of the experiment:
Two different polymers hydroxypropylmethyl cellulose (HPMC K4M) and carbopol were mixed in different ratio to obtain a suitable matrix system for achieving the extended release profile of the drug Sitagliptin. In order to optimize the ratio of HPMC K4 M & carbopol for matrix system used in extended release tablet formulation, different batch is prepared by trial and error method.

ABSTRACT
The present study of Sitagliptin Floating tablets were to develop optimized gastric floating drug delivery system (GFDSS) by using the polymers HPMC K4M and Carbopol 940 to enhance the bioavailability and therapeutic efficacy of Sitagliptin. Various approaches have been followed to encourage gastric retention of an oral dosage form. Floating systems have low bulk density so that they can float on the gastric juice in the stomach. In the present work attempts have been made to prepare Sitagliptin Floating tablets by Direct compression method, 4 formulations (F1 to F4) floating tablets of Sitagliptin were prepared using variable concentrations of HPMCK4M and Carbopol940, buoyancy lag time and the total floating time was studied for all the formulations. FT-IR Studies shown that polymers are compatible with each other and there was no interaction found between polymer and drug.

KEYWORDS: Floating drug delivery system (FDDS), HPMC, Carbopol, Sitagliptin, in-vitro release

Table No1: Composition of different tablet formulations

<table>
<thead>
<tr>
<th>Components (mg)</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>HPMC K4</td>
<td>125</td>
<td>100</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Carbopol</td>
<td>150</td>
<td>200</td>
<td>125</td>
<td>100</td>
</tr>
<tr>
<td>NaHCO3</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Citric acid</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>MCC</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>Mg-Stearate</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>talc</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total weight of Tablet: 600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td></td>
</tr>
</tbody>
</table>

At first all ingredients (HPMC K4M, carbopol, Drug, MCC, NaHCO3, citric acid ) were mixed by geometric dilution. Then Granules are prepared by 16 mesh and subsequently followed by 24 mesh sieve. After that the granules are subjected to drying in hot air oven until 5% moisture retains. After optimum drying the prepared granules are ready for punch in tablet punching machine.

EVALUATION OF FORMULATIONS:
Evaluation was performed to assess the physicochemical properties and release characteristics of the developed formulations.

Hardness Testing:
The resistance of tablet for shipping or breakage, under conditions of storage, transportation and handling, before usage, depends on its hardness. The hardness of tablet of each formulation was measured by Monsanto hardness tester8.

Thickness testing of formulated tablets:
Thickness of tablets was important for uniformity of tablet size. Thickness was measured using Vernier Calipers on 3 randomly selected samples8.

Weight Variation Test of final formulation:
The USP weight variation test is run by weighing 20 tablets individually, calculating the average weight & comparing the individuals tablet weight to the average. The tablets meets the USP test if no more than 2 tablets are outside the percentage limit and if no tablet differs by more than 2 times the percentage limit.

Friability Test:
Friability is the measure of tablet strength. Roche friabilator was used for testing the friability using the following formula.

Friability = (W1-W2) x 100 / W1

Where W1 is the average weight of tablets and W2 is the weight of tablets after 1000 revolutions.
Buoyancy / Floating Test:
The time between introduction of dosage form and its buoyancy on the simulated gastric uid and the time during which the dosage form remain buoyant were measured. The time taken for dosage form to emerge on surface of medium called Floating Lag Time (FLT) or Buoyancy Lag Time (BLT) and total duration of time by which dosage form remain buoyant is called Total Floating Time (TFT). The lag time was carried out in beaker containing 250 ml of 0.1N HCl (pH 1.2) as a testing medium maintained at 37°C 11.

DISSOLUTION STUDY:
Apparatus: Dissolution test apparatus (USP XXIII)
Method: USP type 2 apparatus (paddle)
Dissolution medium: 0.1N HCl + 0.5% SLS
Volume of DM: 900 ml
Temperature: 37 ± 0.5°C
Speed: 50 rpm

Procedure:
The tablet was placed inside the dissolution vessel. 10 ml of sample were withdrawn at time intervals of 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12 hr. The volume of dissolution fluid adjusted to 900 ml by replacing 10ml of dissolution medium after every sample. Each sample was analyzed at 267 nm using double beam UV and Visible Spectrophotometer against reagent blank. The drug concentration was calculated using standard calibration curve 12.

RESULT:
The powder mixtures of all the formulations were tested by various studies including, bulk density (ranging from 0.35 to 0.45 gm/ml), tapped density (ranging from 0.40 to 0.48 gm/ml), Carr’s index (ranging from 6.18 to 12.58%) and Hausner’s ratio (ranging from 1.06 to 1.14). All the results showed moderate flow property

The results of physicochemical characterizations are given in table. The evaluated properties showed good results for further studies. The effect of hardness on buoyancy lag time was studied and results indicated that with increasing the hardness lag time also increased.

CONCLUSION:
A floating extended release formulation of an antidiabetic drug sitagliptin have been prepared by a unique blend of polymer (HPMC) and carbopol matrix, NaHCO3 (Sodium bicarbonate) and
other excipients in an optimized ratio to achieve an extended or delayed drug release profile up to around 12 hours. There is no physical and chemical interaction occurs between drug (sitagliptin) & other excipients during the formulation process. It is supported by FTIR analysis. NaHCO₃ (Sodium bicarbonate) is used in the tablet formulation as a floating agent. NaHCO₃ helps to retain the tablet dosage form by maintaining an optimized floating lag time (FLT) & total floating time (TFT) in the stomach, without disturbing the drug release profile.

REFERENCES: